PB83-256214

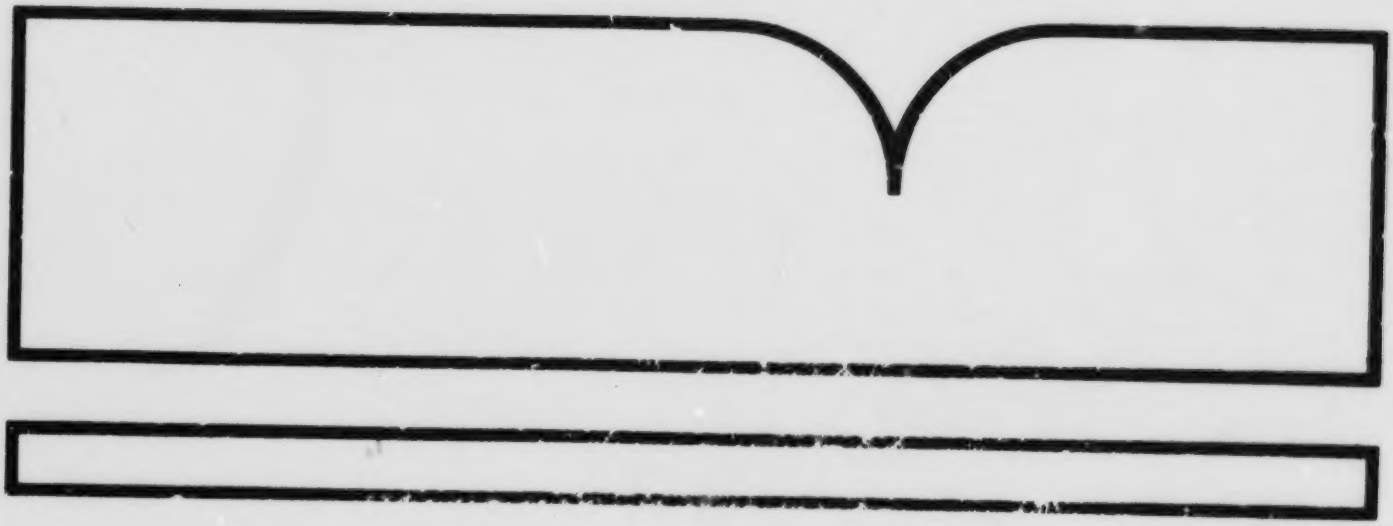
Identifying Potential Asbestos Exposures in Schools: The New York City Experience

New York City Board of Education
Long Island City

Prepared for

Environmental Protection Agency, Washington, DC

Jun 81



U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA 560/5-81-10	2.	3. Recipient's Accession No. PB83 256214
4. Title and Subtitle: Identifying Potential Asbestos Exposures In Schools: The New York City Experience			5. Report Date: June 1981
7. Author(s): J.F. Cesario*, R.A. Chiljean*, A.R. Smith*, E.E. Logue**			6.
			8. Performing Organization Rept. No.
9. Performing Organization Name and Address: *Board of Education of the City of New York, Division of School Buildings, 28-11 Queens Plaza North, Long Island, NY 11101 **Research Triangle Institute, P. O. Box 12194, Research Triangle Park, NC 27709			10. Project/Task/Work Unit No. 1864-13 11. Contract(C) or Grant(G) No. (C) 68-01-5848 (G)
12. Sponsoring Organization Name and Address: Office of Toxic Substances, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460			13. Type of Report & Period Covered: Final Report 14.

15. Supplementary Notes

Revised May 1982

16. Abstract (Limit: 200 words)

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17. Document Analysis a. Descriptors

Asbestos Exposures; Public Schools

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement: Release Unlimited	19. Security Class (This Report): Unclassified	21. No. of Pages
	20. Security Class (This Page)	22. Price

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

United States
Environmental Protection
Agency

Office of Pesticides
and Toxic Substances
Washington DC 20460

EPA 560/5-81-10
June 1981

Toxic Substances

PB83-256214

EPA

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REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA 22161

Identifying Potential Asbestos Exposures in Schools:

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June 1981

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ACKNOWLEDGMENTS

The authors gratefully acknowledge the cooperation of Ms. Cindy Stroup of the U.S. Environmental Protection Agency, Washington, DC, and of Dr. Tyler Hartwell of the Research Triangle Institute, Research Triangle Park, North Carolina.

ABSTRACT

This report describes the experience of the New York City (NYC) Board of Education and their asbestos-in-schools program. The program objectives were to: (a) identify current and potential asbestos exposures in NYC public schools, (b) evaluate the seriousness of these asbestos exposures, (c) recommend appropriate abatement action, and (d) oversee the completion of the recommended action. A survey of all school buildings was completed and priority problem areas were identified. Major abatement activities were scheduled for summer recess periods and completed as funds became available.

I. INTRODUCTION

This report summarizes the experience of the New York City (NYC) Board of Education and their asbestos-in-schools program. The program objectives were to: (a) identify current and potential asbestos exposures in NYC public schools, (b) evaluate the seriousness of these asbestos exposures, (c) recommend appropriate abatement action, and (d) oversee the completion of the recommended actions. The NYC asbestos-in-schools program was created because public concern was focused upon the possible adverse health effects caused by respirable airborne asbestos released by deteriorating asbestos-containing surfacing materials. Various epidemiologic and clinical studies support the existence of a causal relationship between asbestos exposure and chronic nonmalignant respiratory disease, or cancers of the lung, chest, abdominal lining, and gastrointestinal tract (Selikoff and Hammond 1979).

The asbestos-containing materials that can contribute to airborne asbestos levels in schools include soft or friable insulation or sound-proofing materials usually found on ceilings and walls of classrooms, corridors, gymnasiums, and band rooms. In some schools, asbestos-containing materials were applied to structural steel to minimize building collapse during a fire. The Environmental Protection Agency (EPA) has established a guidance program (USEPA 1979) to help State and local officials identify and control potential asbestos exposures in schools. This guidance program was specifically designed to help local school districts comply with the proposed EPA asbestos identification and notification rule.

Subsequent portions of this introductory section are concerned with the sequence of events in the NYC program and organizational considerations.

Major sections of this report deal with field data collection activities, the laboratory analysis of bulk samples, exposure assessment, and abatement activities. The last two sections describe recordkeeping and reporting in the NYC program, and NYC program recommendations.

A. Sequence of Events in the New York City Program

The Division of School Buildings of the New York City Board of Education became aware of a potential asbestos exposure problem in New York City schools on January 5, 1977. During the previous month, six elementary schools in New Jersey were closed because of parental concern about elevated health risks subsequent to asbestos exposures in these schools. On January 7, Division of School Buildings (DSB) personnel were assigned to review architectural specifications for buildings constructed between 1946 and 1971, but it was quickly recognized that physical inspections would be necessary to identify suspect materials. On January 10, the DSB Director met with officials from the New York City Environmental Protection Agency who agreed to collect air and bulk samples in selected schools. Later in 1977 and early 1978, DSB personnel began exploring different abatement options, but delays in completing specifications and reviewing contractor bids slowed the program.

In November of 1978, the newly appointed Executive Director of DSB established the Asbestos Task Force. One impetus for the increased DSB activity at this time was that Community School Board #3 closed PS 185/208 in Manhattan because of exposed asbestos-containing fireproofing above vandalized suspended ceilings. Thus, preliminary contractual agreements were quickly finalized, and DSB initiated the removal of asbestos-containing materials from 11 buildings that had been inspected previously. This abatement work began during vacation periods in November and December. In January 1979, the

Director issued an "emergency oral order" and abatement activities began at PS 185/208 Manhattan. During the remainder of 1979 and in 1980, the surveying of school buildings and the collection of bulk samples of suspect materials continued. Abatement activities were carried out during the summer recess months in 1979 and 1980.

An initial review of the architectural specifications of 321 buildings constructed between 1946 and 1971 suggested that approximately 185 school buildings had asbestos-containing materials--i.e., spray-on fireproofing, insulation, acoustic treatments, or trowelled-on acoustic plaster. By January 1981, the DSB had visually inspected 1,411 buildings; 18 percent (257/1411) of these buildings had asbestos-containing materials confirmed by bulk sample analysis. Conflicting laboratory results (some positive, others negative) were received for bulk samples collected in an additional five buildings. Abatement activities were completed in 60 percent of the target schools (257) by January 1981. Other abatement projects were scheduled for the 1981 and 1982 summer recess periods.

B. Organizational Considerations

The Division of School Buildings is responsible for the construction, maintenance, and operation of all (1,411) structures operated by the NYC Board of Education. Approximately 1,000 of these structures are school buildings. No other Board of Education Divisions were involved in the asbestos abatement program. Other organizations involved in the initial (1976-77) survey phase included the New York City Environmental Protection Agency, the New York City Health Department, and the Environmental Sciences Laboratory at the Mount Sinai School of Medicine.

The Asbestos Task Force established in November of 1978 included a planning group and a field group. The planning group consisted of a task force director (administrative architect), four architects, and a secretary. The field group

consisted of four supervisors of school maintenance, five civil engineers, three superintendents of construction, and two mechanical engineers. An academic consultant was also hired to advise the DSB on measuring asbestos exposures. By January 1981, 49,560 person-hours had been expended by the DSB in asbestos-related activities. The cost of these person-hours was $423,765 plus an additional $9,500 for the academic consultant. Office space and office equipment were provided by DSB for the Asbestos Task Force. The EPA guidance document (USEPA 1979) referred to previously and the Occupational Safety and Health Administration Regulation 1910.1001 (OSHA 1973) concerning asbestos provided a technical framework for establishing the New York City Asbestos-In-Schools Program.

The DSB dissolved the field group of the Asbestos Task Force when all 1,411 buildings had been surveyed at least once. The planning group originally delegated the writing of asbestos abatement specifications to the various borough offices of DSB and reviewed the prepared documents, but the planning group has recently prepared standard specifications for the various types of abatement activities--sealing, encapsulation, enclosure, and removal. This centralized process should improve the uniformity and the quality of abatement work throughout the NYC school system.

The salaries of the Asbestos Task Force members were paid from funds in the operating expenses budget of the City of New York; the abatement activities were financed from the capital budget. DSB has applied to the State Department of Education to help pay for the $4.7 million spent for abatement activities as of September 1980. The 1982 State budget has approximately $3.5 million for asbestos abatement grant programs, and the DSB has obtained a percentage of the money expended for work to date. It should be pointed out

that the expenditure of New York City funds to identify and control asbestos exposures in schools required some difficult trade-offs. The approximately $5 million spent for asbestos-related activities could have been used to modernize five existing schools, or to pay part of the cost of a new elementary school to replace an aging school still in use, but local political pressure supported the DSB decision to give asbestos control a high priority.

A major impetus for the initial establishment of the Asbestos Task Force was parental concern about asbestos-related health risks in PS 185/208. An individual who is very active in the Parents Association in PS 185/208 noticed the gray shaggy looking material on a steel beam behind broken acoustical tile and made inquiries. This individual was told that the suspect material was probably asbestos and that serious health problems can result from exposure to asbestos. Other parents in the association shared this concern about the material's presence and applied pressure to the local school board until the school was closed.

The school closing, and the nature of the subsequent abatement activity received attention from national television news organizations and local print journalists. DSB's strategy for dealing with the questions of reporters was to provide them with all of the available facts and to acknowledge DSB's ignorance about many issues. A frequent response to a journalist's question was, "We don't know, but we will do our best to find out and get back in touch with you." This open relationship with the press helped to clarify a complex problem and kept all the other schools open.

One quarter of a million dollars was eventually spent on abatement activities in PS 185/208. Containment and limited encapsulation were the abatement

methods decided upon after lengthy negotiations with the parents' representatives. DSB's consultants from Mt. Sinai School of Medicine helped to reassure the parents that containment (the construction of a substantial physical barrier) and encapsulation (application of a penetrating semirigid coating) were sufficient to isolate the asbestos from the student population at risk. In sum, the experience at PS 185/208 demonstrated that DSB was dealing appropriately with a complex problem, and helped make subsequent abatement activity much more cost-effective by familiarizing building contractors with the precautions needed to work with asbestos.

II. FIELD DATA COLLECTION ACTIVITIES

This section describes the two major components of DSB's field data collection activity: building inspection and bulk sampling. The objective of the building inspections was to identify the location and physical condition of friable materials that could contain asbestos. The objective of bulk sampling was to obtain representative samples of the suspect materials for laboratory analysis. Laboratory analysis of bulk samples is a necessary prerequisite for a credible asbestos-in-schools program because neither the presence of asbestos in friable materials, nor the amount, can be reliably ascertained by visual inspection.

A. Building Inspection

In New York City, the identification of asbestos-containing materials in school buildings was facilitated by assuming that asbestos is most likely to be present in boiler or pipe coverings, sprayed-on fireproofing, sprayed-on acoustical materials, and acoustical plaster or tile. DSB inspections concentrated upon sprayed-on materials and acoustical plaster because these materials were more likely to contribute to student exposures. DSB's inspection strategy was to examine every physically defined space or room in the building.

Asbestos-containing sprayed-on material was visible on exposed structural steel in nonstudent areas, but in student areas the suspect material was hidden behind lightweight suspended ceilings. If the sprayed-on material was used for fireproofing it was usually found throughout the building, whereas sprayed-on acoustic material was more localized in those areas where noise was more of a problem. Sprayed-on acoustic material was found in music rooms, swimming pools, gymnasiums, cafeterias, and boiler rooms. If asbestos was present in the sprayed-on material, subsequent laboratory analysis usually showed that the percentage ranged between 20 and 60 percent.

The trowelled-on acoustic plaster was much more varied in its asbestos content. DSB's experience with acoustic plaster suggests that two samples of this material taken 20 feet apart will often give contradictory impressions; i.e., one sample might indicate that the material was 10 percent asbestos, while the other sample might indicate that no asbestos was present. This variation in the percentage of asbestos present in acoustic plaster was probably a result of the heterogeneity of the plaster mix, the relatively low percentage of asbestos, and the relative difficulty of analyzing this type of material. One way of dealing with the problem of a heterogeneous plaster mix was to collect multiple bulk samples from the same ceiling or wall area so that the empirical estimate of the "average" asbestos content would be more stable. The problem of laboratory quality control is discussed in Section VII. In the New York City schools, acoustic plaster was found in corridors, libraries, auditoriums (ceilings and walls), lunchrooms, and music rooms.

Manufactured acoustic tile was a fourth material that occasionally contained asbestos. DSB sampled many sites where acoustic tile was used, and received laboratory reports indicating that no asbestos was present. Yet DSB did receive reports on acoustic tile samples from other States that indicated that the tile was 4 or 5 percent asbestos. DSB concluded that certain brands of acoustic tile may contain asbestos. Typical areas where acoustic tile was used included libraries, lunchrooms, corridors, swimming pool areas, music rooms, auditoriums, and kindergartens.

B. Bulk Sampling

During their building inspections, DSB identified suspect materials by noting the use of the materials and their physical appearance. DSB did not follow a uniform sampling rule based upon square footage when bulk samples of the suspect material were taken. Rather, DSB's overall approach to the sampling

problem was to take one non-random bulk sample from each type of similarly appearing suspect material within each school building. When the suspect material was located in multiple classrooms in a building, DSB took one sample from every five to seven classrooms. When fewer classrooms were involved, DSB took only one sample. When the suspect material was located in corridors on several floors of a school building, DSB first took one sample from the first floor corridor. After DSB became aware of the heterogeneity of some of the suspect materials (like acoustic plaster), they took one sample from each corridor on each floor of the building. In large areas like auditoriums, there was also an evolution of the sampling strategy from a single sample to multiple samples after the heterogeneity problem was recognized. Thus, within a given building a single (non-random) sample may have been taken of acoustical plaster in one corridor or of friable materials in a sound control room. Yet if a given material was used extensively in a building, as many as six samples may have been taken of the same type of material. In one large building, 60 to 70 samples were taken by DSB personnel because of the amount of suspect acoustical plaster present and because of conflicting laboratory results. Overall, the need for multiple samples of identically appearing suspect material from the same building can depend upon the heterogeneity of the suspect material, whether or not the true percentage of asbestos in the material is high or low, and the cost of probable abatement action.

A preliminary EPA guidance document (USEPA 1979) has suggested that "one sample should be taken for approximately every 5,000 square feet of material having the same color and texture, while material of a different appearance should be sampled separately." Revised guidelines for bulk sampling are presented in a document (USEPA 1980a) that was developed subsequent to the New York City Asbestos-In-Schools Program. Since the average classroom has

approximately 700 square feet of ceiling (28 ft. x 25 ft.), the one sample per 5,000 square feet rule implies that a sample should be taken in every seven classrooms where ceiling materials are a concern. If suspect materials on the walls and ceilings of classroom are a concern, then the same sampling rule would require multiple samples in every seven classrooms. DSB usually took more samples than the number dictated by the 5,000-square-feet rule if relatively expensive abatement procedures were being considered for large areas like corridors or auditoriums because it was important to have accurate data in these situations.

Bulk samples were collected by twisting the open end of a plastic 35-mm film canister into the softer materials. If the material was too hard to use this technique, a knife was used to scrape off a small patch of the material into the film canister. When the softer materials were sampled, the canister was usually filled, while only one quarter to one-half of a canister of the harder acoustic plaster was taken. Samples of these sizes were more than adequate for several laboratory analyses of either material type.

After a ceiling sample was taken, the floor beneath the sampling area was wet-cleaned to minimize the reentrainment of any asbestos fibers released during the sampling process. Similar wet cleaning was performed after wall samples were taken. DSB personnel who were taking samples did not routinely use respirators to avoid alarming students and teachers. Sampling personnel either held their breath, if they were taking samples during school hours, or they were offered a respirator for use when they took the samples during nonschool hours.

Each sample canister had a pressure sensitive label indicating the name of the building where the sample was taken, the type of material, the location in the building, the sampling person's name, and the date. A unique sequential

sample identification number was also assigned to each sample at DSB headquarters where a running log of sample numbers and relevant descriptive information (borough, district, school) was maintained. Certain samples were split into two or three subsamples when ID numbers were assigned so that replicate laboratory analyses could be obtained.

Prior to the sample splitting, the sample was homogenized in the original canister so that the subsamples would be more representative of the whole. However, DSB discovered that it was possible to pulverize and grind some acoustical plaster samples so thoroughly that laboratory analysts had a very difficult time finding the fibrous asbestos-like materials in the low percentage mixtures. Thus, it was recognized that the mixing process had to be relatively controlled. DSB found that gentle stirring with a spatula was sufficient to homogenize the sample without obliterating the asbestos fibers. It should be added that the individual who was responsible for mixing and splitting samples used a respirator.

Batches of several hundred film canister samples were stockpiled at DSB headquarters before they were sent to the analytical laboratories. Individual film canisters with their identification labels were closely packed in cardboard boxes, padded with foam, and mailed to the laboratories. No other special handling was required; the canisters did not pop open during shipment.

By January 1981, DSB had collected approximately 2,100 samples from 1,411 school buildings. However, it should be recalled that only 257 (18 percent) buildings had asbestos-containing materials that could contribute to the airborne asbestos levels experienced by students, teachers, and school administrators.

DSB had 14 supervisor/engineers working full time inspecting buildings and collecting samples from November 1978 to December 1979. The general

sampling strategy was to concentrate upon (a) soft material located in boiler rooms, fan rooms, music rooms, cafeterias, or applied to structural steel; and (b) upon acoustic plaster located in corridors, auditoriums, libraries, and other rooms where quiet conditions were necessary. Boiler/pipe coverings and acoustic tile received less emphasis; but they were sampled nonetheless. The personnel taking samples were specifically told to look for (a) soft, fluffy material about 1-1/2 inches thick on boiler room or mechanical room ceilings; (b) soft-cementious spray-on material applied to structural steel; and (c) trowelled-on acoustic plaster on ceilings of corridors, libraries, cafeterias, or on ceilings and walls of auditoriums, music rooms, and sound control rooms. After suspect material in each school was located, samples were taken and the physical characteristics of the area were rated by means of an asbestos exposure algorithm, which was described on the back of the survey forms carried by the building inspectors/samplers (see Appendix A).

III. LABORATORY ANALYSIS OF BULK SAMPLES

This section describes the accepted protocol for the laboratory analysis of bulk samples for asbestos fibers, DSB's laboratory quality assurance procedures, and results from DSB's bulk sampling program. These bulk sampling results are based upon data sheets accumulated by DSB in 1979 and 1980.

A. Polarized Light Microscopy with Dispersion Staining

Present technology suggests that polarized light microscopy with dispersion staining (PLM/DS) is the most cost-effective laboratory procedure for the identification of asbestos in bulk samples. Other laboratory procedures such as X-ray diffraction analysis and electron microscopy are used for confirmation in difficult samples, but these latter techniques are more expensive, and many laboratories have had less experience with them. The four primary laboratories that processed DSB samples used PLM/DS, supplemented by the occasional use of X-ray diffraction analysis.

In general, the identification of asbestos by means of PLM/DS is based upon the difference between the refractive index of the suspect fiber and the index of the liquid medium in which the fiber is immersed (McCrone et al. 1978). For example, chrysotile asbestos will transmit a blue color if the chrysotile fibers are perpendicular to the polarized light and immersed in the appropriate refractive oil. The microscopist identifies the asbestos fibers in a mixture of fibrous and nonfibrous material by changing refractive oils and rotating the polarizing filter.

The Environmental Protection Agency has recognized the importance of bulk sample analysis and the need for increasingly reliable and valid PLM/DS estimates. Thus, the EPA has supported a program of laboratory standardization (USEPA 1981) and the development of more systematic PLM/DS protocols (Lentzen et al. 1981). The EPA also contracted with McCrone Laboratories to conduct

intensive 1-week courses on the analysis of bulk samples via PLM/DS in each of the 10 EPA administrative regions.

The DSB had no in-house PLM/DS expertise when the Asbestos Task Force was formed, but two DSB staffers completed the intensive EPA-sponsored course given by McCrone Laboratories in New York City's Federal Plaza building. Neither staffer had prior experience with a microscope; nevertheless, they did develop the ability to identify asbestos fibers in many samples.

When DSB received conflicting laboratory reports, the in-house microscopists would check the relevant subsample before sending a portion of it to a third laboratory. The DSB microscopists found that, in many instances, their analytical results were confirmed by the third laboratory. However, the analytical results obtained by the in-house microscopists were never used as the sole basis for abatement decisions.

By January 1981, DSB had spent approximately $95,000 for 3,800 laboratory analyses of bulk samples and subsamples from approximately 2,100 sampling sites. Replicate analyses constituted 45 percent (1700/3800) of the work performed. The average laboratory charge per analysis was $25, but the volume of laboratory work required by DSB facilitated the negotiation of relatively favorable contracts between DSB and their principal laboratories.

The average turnaround time for a single PLM/DS analysis from a commercial laboratory was 3 or 4 weeks, which did not delay any abatement work. However, abatement activity was delayed when two conflicting laboratory reports were received and third or fourth opinions had to be obtained. DSB gratefully acknowledges the cooperation of the Environmental Sciences Laboratory at Mt. Sinai, which frequently gave same-day service in these conflicting report situations.

B. Quality Assurance

The first bulk samples collected in NYC during 1977 were sent to the Environmental Sciences Laboratory at the Mount Sinai School of Medicine because of the laboratory's previous experience analyzing bulk insulation materials for asbestos content. The laboratory's location in New York City and its affiliation with the City University also made it a logical choice. However, the Environmental Sciences Laboratory did not have the capability of analyzing large numbers of bulk samples, so DSB had to find two commercial laboratories to assist. In 1979, DSB signed contracts with McCrone Laboratories in Chicago, Illinois, and with GCA Corporation in Bedford, Massachusetts.

In 1980, DSB signed a third contract with the State University of New York at New Paltz in order to have a third opinion when conflicting analysis reports were obtained from the two commercial laboratories. DSB considered two laboratory reports to be in conflict when one report indicated that asbestos was present, and the second report indicated that no asbestos was present. Yet, reports of 5 percent and 10 percent were not considered to be in conflict because both reports indicated that asbestos was present. DSB was more interested in determining the presence of asbestos in a given sample, (i.e., $\geq$ 1 percent) than in estimating the exact percentage of asbestos.

DSB's administrative interpretation of a single laboratory report suggesting that a sample had less than 1 percent asbestos was influenced by the information received from the other two laboratories. Thus, if two laboratory reports were in a yes/no conflict, a third report of less than 1 percent was interpreted as confirming that no asbestos was present in the sample. Yet if one report was positive (equal to or greater than 1 percent asbestos, and two other reports indicated that less than 1 percent asbestos was present, then DSB concluded asbestos was present at the sampling site. The rationale behind

this latter decision was that all three laboratories were able to detect some asbestos in their subsamples. Table 1 lists examples of conflicting laboratory results from two laboratories and an indication of DSB's administrative decisions when results were received from the third laboratory.

Conversations between DSB and the three laboratories suggested that many of the conflicting analysis reports could be traced to differences in the relative proficiencies of individual microscopists employed by the three laboratories. In addition, some conflicting reports may have been caused by the heterogeneity of the subsamples (usually acoustic plaster).

In summary, DSB's laboratory quality assurance efforts centered upon interlaboratory differences, not upon intralaboratory differences. Thus the DSB did not return intentionally disguised (blind) subsamples from the same sampling site to the original laboratory for reanalysis. Rather, subsamples from the same site were always sent to different laboratories. During the period when its workload was the heaviest, the Asbestos Task Force was primarily concerned with reconciling laboratory conflicts rather than creating them by comparing a laboratory's performance with itself over time.

C. New York City Bulk Sampling Program Results

Table 2 displays the asbestos content of bulk samples collected by DSB in NYC schools by borough. These data are based upon the laboratory analysis of 2,359 bulk samples collected in 266 schools where asbestos-containing materials were present. Inspection of the last row in the table reveals that the average number of samples per school varied from 7.9 to 24.1 across the five boroughs. More samples were taken by DSB personnel if the school was larger, if the school had heterogeneous suspect materials, or if laboratory results were in conflict. The asbestos content data displayed in Table 2 may not yield an accurate statistical description of the true situation

in the 266 schools because a statistically valid sampling rule was not followed when the bulk samples were collected. Nevertheless, the data in Table 2 clearly suggest that the asbestos content of suspect materials can range from less than 1 percent to well over 50 percent. A typical sample among all 2,359 samples had an asbestos content between 6 and 50 percent, but among the samples from Brooklyn and Queens, a typical sample had a greater chance of being less than 1 percent asbestos. However, it is not clear from the data that the schools in Brooklyn and Queens with asbestos-containing materials have different levels of asbestos in their suspect materials or that the apparent differences are an artifact of the bulk sample collection procedures.

Table 1. Bulk Sample Analyses: Interlaboratory Differences[a]

School number	Sample number	Lab A	Lab B	Lab C	DSB decision
1	1517	1-3%	<5%	<1%	Yes[b]
1	1518	2-3%	<1%	<1%	No[c]
1	1918	1-2%	1-5%	<1%	Yes
2	944	<1%	5-10%	<1%	No
2	1706	6-9%	<1%	<1%	No
2	1707	1-3%	<1%	<1%	No
3	1876	1-2%	<1%	<1%	No
3	1877	1-2%	<1%	<1%	No
3	1878	1-3%	<1%	<1%	Yes
4	887	<1%	<1%	<1%	No
4	889	<1%	<1%	<1%	No
4	890	<1%	<1%	<1%	No
5	1985	<1%	1-2%	<1%	No
5	1986	<1%	1-2%	<1%	No
5	1987	<1%	1-2%	<1%	No
6	1911	1-3%	<1%	<1%	No
6	1912	1-2%	<1%	<1%	Yes
6	1913	1-2%	<1%	<1%	No
7	1883	2-4%	<1%	1%	Yes
7	1884	1-2%	<1%	1%	Yes
7	1885	1-2%	<1%	<1%	No
8	1068	<1%	<5%	<2%	Yes
8	1100	<1%	10%	<1%	No
9	1342	1%	<1%	1%	Yes
9	1343	1-2%	<1%	1%	Yes
9	1344	1%	<1%	1%	Yes

[a]Interlaboratory comparison assumes that portions of a homogeneous sample were sent to the three laboratories.

[b]Yes = asbestos present.

[c]No = no asbestos present.

Table 2. Asbestos Content of Bulk Samples Collected in New York City Schools by Borough[a]

Asbestos content (%)[b]	Borough										All boroughs	
	Manhattan		Staten Island		Bronx		Brooklyn		Queens			
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
<1	73	(17)	3	(1)	59	(14)	136	(34)	346	(43)	617	(26)
1-5	89	(21)	6	(2)	28	(6)	61	(15)	33	(4)	217	(9)
6-50	111	(26)	179	(62)	348	(80)	156	(39)	83	(10)	877	(37)
>50	153	(36)	101	(35)	--	--	44	(11)	350	(43)	648	(27)
Total samples[c]	426	(100)	289	(100)	435	(100)	397	(100)	812	(100)	2359	(100)
Total schools[d]	54		12		67		51		82		266	
Samples per school[e]	7.9		24.1		6.5		7.9		9.9		8.9	

[a] Logue, EE, Hartwell, TD. 1982. (January) Research Triangle Institute. Characteristics of an asbestos exposure assessment algorithm. EPA Contract No. 68-01-5845.

[b] Estimated by polarized light microscopy.

[c] Samples from schools with detectable levels of asbestos in suspect materials.

[d] Schools with detectable levels of asbestos in suspect materials.

[e] More samples were taken if the schools were larger, or if they had heterogeneous appearing materials, or if laboratory results were in conflict.

IV. EXPOSURE ASSESSMENT

This section describes DSB efforts to assess the seriousness of the exposure situation in the 250 schools where asbestos-containing materials were identified. From DSB's point of view, a serious exposure problem was one in which large numbers of students and school personnel might be subject to relatively high levels of airborne asbestos for long periods of time, and a less urgent exposure problem was one in which small numbers of students and school personnel might be subject to trace levels of airborne asbestos for short periods of time. Thus, although the bulk sampling program clearly indicated that asbestos-containing materials were present in several hundred NYC schools, there were no clearcut data available to indicate the seriousness of a given situation.

A. Air Monitoring Problems and Experience

DSB did not monitor airborne asbestos on a routine basis because of the associated air sampling and laboratory analysis costs, technical difficulties, and public relations problems. Monitoring airborne asbestos in schools is expensive because the samples collected on membrane filters should be characterized by electron microscopy rather than the less expensive phase contrast microscopy. The latter technique cannot distinguish asbestos fibers from other fibers such as fiberglass. Air monitoring is also technically difficult because airborne asbestos concentrations can change over time as some fibers settle to the floor and others are reentrained or released from the bulk material by human or mechanical activity. In short, the episodic nature of airborne asbestos concentrations requires long sampling times under a variety of building conditions. Moreover, background levels or airborne asbestos would also need to be measured because ambient urban air can influence building

air concentration estimates. Finally, air monitoring might unnecessarily alarm students, teachers, and parents and disrupt classroom routines because the sampling pumps would have to be operated continuously while school was in session.

DSB's experience with air monitoring illustrates the technical difficulties associated with this method of exposure assessment. In one school, airborne asbestos fiber counts were lower on a floor where extensive removal of asbestos-containing material was taking place than on another floor where the same material was undisturbed. An investigation of the urban area around the school revealed that an apartment building across the street from the school was being demolished. This demolition included the removal of old hot water heating pipes that had been wrapped with asbestos-containing material. DSB's consultants concluded that an open window on the undisturbed school building floor had allowed asbestos fibers from the demolition project to enter the school. Thus the airborne fiber counts on the "undisturbed" school building floor were increased by contaminated ambient air. The original concern about the unexpected difference between airborne fiber counts inside the school might have been avoided if outside and inside air had been sampled simultaneously and the demolition effects had been noted.

In another school, airborne fiber counts in a cafeteria were quite different when two samples were taken 10 days apart. The domed ceiling of the cafeteria was covered with a 2-inch layer of very fluffy, sprayed-on asbestos-containing material. DSB concluded that either alternating cold nights and warm days were disturbing the very high ceiling, or that someone had sabotaged the second measurement by throwing a quantity of the ceiling material into the sampler's intake port. This example illustrates (a) the need for taking multiple air samples over time so that changing meteorological conditions can

be taken into account and (b) the difficulties associated with placing sensitive scientific equipment in areas where it may be tampered with.

B. An Exposure Assessment Algorithm

The air sampling problems experienced by DSB underline the general need for a relatively inexpensive and technically simple procedure for estimating asbestos exposures in schools. Thus DSB personnel were quite interested when the EPA and one of their consultants indicated that a preliminary draft of an asbestos exposure assessment algorithm had been prepared (see Appendix A). This asbestos exposure algorithm combines information from the laboratory analysis of a bulk sample with ratings of seven physical characteristics at the sampling site. However, there were no data indicating that the proposed algorithm was predictive of airborne asbestos levels. (After DSB completed its inspection and assessment activities, the EPA sponsored a study of the algorithm's relationship with airborne asbestos levels. Preliminary results from this study suggest that the proposed algorithm is not related to airborne asbestos levels.)

Consequently, DSB used the asbestos algorithm as a guide for data collection, rather than as a procedure for estimating exposure scores, because DSB was not convinced that the exposure scores per se had a great degree of measurement validity. The scores were calculated at DSB's central office, but specific cutpoints were not referred to when decisions were made about abatement action. DSB preferred to rely upon the informed judgments of Asbestos Task Force members who accumulated an impressive amount of experience as the asbestos program progressed.

The task force usually concentrated on the material's accessibility, its general condition, and the level of activity at the site when they made their abatement decision. If the material contained asbestos, and was accessible

and damaged, it was usually decided that abatement should be carried out. Removal of asbestos-containing material was only considered when the material was very friable. Damaged material was routinely contained, regardless of the percentage of asbestos (over 1 percent) present, or the degree of damage, because it was assumed that asbestos fibers would be released into the air in the future, even if they were not already present.

C. New York City Algorithm Results

Table 3 presents empirical distributions of the eight (asbestos exposure assessment) algorithm components by borough and for all boroughs. The data are based upon DSB inspections in schools where asbestos-containing materials were found (see Table 2). The data for all boroughs suggest that the majority of sites were not damaged, were fully exposed, were not highly accessible, were subject to moderate levels of human activity, were not subject to an air plenum, and had materials with low friability. However, exceptions to this pattern can be identified when the borough-specific data are examined. More damaged materials were identified in Queens, and more highly friable materials were identified on Staten Island.

Table 4 presents empirical distributions of exposure assessment algorithm scores by borough and for all boroughs. The data given in Table 4 suggest that the typical algorithm score calculated by DSB was less than 24, although a few scores in excess of 85 were noted in each borough.

The information included in Tables 3 and 4 should be considered highly provisional because a positive relationship between algorithm scores and airborne asbestos levels has not been established. In addition, there is the possibility that these data do not fairly represent the true situation in New York City because a uniform, defensible sampling rule was not followed when bulk samples and algorithm data were obtained.

Table 3. Distributions of Algorithm Components by Borough[a]

Algorithm component codes	Borough										All boroughs	
	Manhattan		Staten Island		Bronx		Brooklyn		Queens			
	Number (percent) of sites inspected											
Material condition	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
No damage (0)[b]	452	(72)	221	(78)	485	(79)	209	(53)	591	(46)	1958	(61)
Moderate (2)	158	(25)	46	(16)	109	(18)	151	(38)	660	(52)	1124	(35)
Widespread (5)	12	(2)	15	(5)	16	(3)	37	(9)	24	(2)	104	(3)
	622	(99)[c]	282[d]	(100)	610[d]	(100)	397	(100)	1275	(100)	3186	(100)
Water Damage												
None (0)	522	(84)	232	(82)	551	(90)	288	(73)	1160	(91)	2753	(86)
Minor (1)	62	(10)	2	(1)	40	(7)	40	(10)	84	(7)	228	(7)
Major (2)	41	(6)	48	(17)	22	(3)	69	(17)	31	(2)	211	(7)
	625	(100)	282[d]	(100)	613	(100)	397	(100)	1275	(100)	3192	(100)
Exposed surfaces												
None (0)	108	(17)	209	(72)	195	(32)	97	(24)	404	(32)	1013	(32)
<10% (1)	31	(5)	22	(8)	111	(18)	37	(9)	18	(1)	219	(7)
≥10% (4)	485	(78)	58	(20)	307	(50)	263	(66)	853	(67)	1967	(61)
	624[d]	(100)	289	(100)	613	(100)	397	(100)	1275	(100)	3199	(100)

Table 3 (continued)

Algorithm component codes	Borough										All boroughs	
	Manhattan		Staten Island		Bronx		Brooklyn		Queens			
	Number (Percent) of Sites Inspected											
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Accessibility												
No (0)	256	(41)	213	(74)	360	(59)	145	(37)	394	(31)	1368	(43)
Low (1)	329	(53)	68	(24)	208	(34)	190	(48)	704	(55)	1499	(47)
High (3)	40	(6)	8	(3)	45	(7)	62	(16)	174	(14)	329	(10)
	625	(100)	289	(100)	613	(100)	397	(100)	1272[d]	(100)	3196	(100)
Activity												
None (0)	258	(41)	--	--	398	(65)	92	(23)	394	(31)	1142	(36)
Moderate (1)	330	(53)	251	(87)	172	(28)	212	(53)	704	(55)	1669	(52)
High (3)	37	(6)	38	(13)	41	(7)	93	(23)	174	(14)	383	(12)
	625	(100)	289	(100)	611[d]	(100)	397	(100)	1272[d]	(100)	3194	(100)
Plenum												
No (0)	558	(92)	276	(96)	322	(53)	269	(68)	1069	(90)	2494	(81)
Yes (1)	48	(8)	13	(4)	291	(47)	127	(32)	120	(10)	599	(19)
	606[d]	(100)	289	(100)	613	(100)	396[d]	(100)	1189[d]	(100)	3093	(100)
Friability												
Low (1)	328	(53)	13	(5)	144	(24)	152	(38)	762	(64)	1399	(47)
Moderate (2)	141	(23)	2	(1)	430	(70)	56	(14)	19	(2)	648	(22)
High (3)	153	(25)	274	(94)	35	(6)	145	(37)	346	(29)	953	(32)
	622[d]	(100)	289	(100)	609[d]	(100)	353	(89)[e]	1127	(95)[f]	3000	(100)

Table 3 (continued)

Algorithm component codes	Borough										All boroughs	
	Manhattan		Staten Island		Bronx		Brooklyn		Queens			
	Number (Percent) of Sites Inspected											
% Asbestos	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
<1 (0)	73	(17)	3	(1)	59	(14)	136	(34)	346	(43)	617	(26)
1-5 (1)	89	(21)	6	(2)	28	(6)	61	(15)	33	(4)	217	(9)
6-50 (2)	111	(26)	179	(62)	348	(80)	156	(39)	83	(10)	877	(37)
≥51 (3)	153	(36)	101	(35)	--	--	44	(11)	350	(43)	648	(27)
	426[d]	(100)	289	(100)	435[d]	(100)	397	(100)	812[d]	(100)	2359	(100)

a See footnote a, Table 2.

b Exposure assessment algorithm component rating codes.

c Three observations were coded "1".

d Total varies because of missing data.

e Fourty-four observations were coded "0".

f Sixty-eight observations were coded "0".

Table 4. Distributions of Asbestos Exposure Assessment Algorithm Scores[a] by Borough

Score[b] interval	Borough										All boroughs	
	Staten Island		Manhattan		Bronx		Brooklyn		All Five Queens			
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
0-24	371	(89)	213	(76)	397	(92)	315	(79)	706	(89)	2002	(86)
25-54	38	(9)	30	(11)	25	(6)	39	(10)	50	(6)	182	(8)
55-84	6	(1)	25	(9)	8	(2)	33	(8)	28	(4)	100	(4)
85-114	3	(1)	12	(4)	1	(0)	4	(1)	12	(2)	32	(1)
115-144	0	(0)	2	(1)	0	(0)	4	(1)[c]	1	(0)	9	(0)
Total	418	(100)	282	(100)	431	(100)	395	(100)	797	(100)	2325	(100)

[a] Source: USEPA. 1979 (September). U.S. Environmental Protection Agency. Asbestos exposure assessment algorithm. Draft report. Washington, D.C.: Office of Toxic Substances, USEPA.

[b] SCORE = (Material Condition Rating + Water Damage Rating + Exposed Surfaces Rating + Accessibility Rating + Activity Rating + Plenum Rating) x Friability Rating x % Asbestos Rating.

[c] Two observations exceeded 144.

V. ABATEMENT OPTIONS

This section describes DSB's general experience with five different abatement options and presents unit cost estimates for each option. Each time asbestos-containing materials were identified. DSB considered the following five abatement options:

- General monitoring--the periodic acquisition of data concerning building conditions at a previously inspected site where asbestos-containing materials are located.
- Sealing--the application of multiple coats of latex paint to a relatively hard surface.
- Encapsulation--the application of a penetrating binder to a more friable surface.
- Containment--the construction of a gypsum board barrier.
- Removal/replacement--the removal of friable soundproofing or thermal insulation and the substitution of suitable nonasbestos-containing material.

A. Abatement Experience

DSB required all abatement contractors to follow Occupational Safety and Health Administration (OSHA 1973) rules pertaining to work with asbestos. DSB contracted for the removal of soft friable materials when they were exposed in student-occupied areas such as lunch rooms, swimming pools, and music rooms. DSB also contracted for the removal of damaged or deteriorating friable material that was exposed in custodial spaces such as boiler rooms or fan rooms. Undamaged exposed friable material in custodial spaces was encapsulated by spraying it with a sealant. Damaged acoustic plaster or accessible acoustic plaster in student areas was contained by installing a dropped ceiling of

gypsum board and acoustic tile. DSB hired contractors to seal undamaged/ inaccessible acoustic plaster on auditorium or library ceilings with three coats of latex paint, and previously painted acoustic plaster was monitored for damage so that containment could be carried out when problems appeared.

DSB's first abatement project involving the removal of soft acoustic material from a cafeteria ceiling, was completed by a general contractor with no prior asbestos experience. Thus, DSB hired a foreman from an experienced asbestos contractor to set up and supervise DSB's project. DSB assigned one of their own construction inspectors to the first abatement project for on-the-job training. DSB also took photographic slides of the removal activity and the required health and safety precautions. The resulting slide presentation and narration was used to train contractors for subsequent abatement projects.

At present, DSB conducts preliminary training seminars for all prospective bidders and in-depth training seminars for the employees of contractors awarded a specific job. DSB discovered that this two-stage educational effort was necessary because the workers actually engaged in removing asbestos-containing materials had not been informed of the hazards of working with asbestos despite the fact that their supervisors had attended a preaward training session.

DSB training sessions now use slide cassettes and a film that were professionally prepared under a government grant during abatement work at two NYC schools. The slide and film package is available through OSHA regional offices for general use in training contractors, foremen, workers, and school administrators.

Air samples were collected and fiber counts were estimated by phase contrast microscopy when asbestos removal work was underway, but the time

required for laboratory analysis of the samples decreased the usefulness of the results. OSHA regulations state that air samples should be collected both inside and outside of the sealed work area. Yet in many instances the abatement project was completed within 2 weeks, and it usually required 2 weeks for DSB's laboratories to complete their analyses of the air samples. Thus air monitoring could not be used to verify compliance with OHSA regulations during most removal jobs. However, DSB found that air monitoring was useful to document the thoroughness of the final cleanup of the worksite. During the actual removal activity, DSB found that a visual inspection for dust outside of the sealed work area was sufficient in terms of increasing contractor compliance with OSHA regulations. Of special interest was the finding that fiber counts were generally higher during encapsulation projects than during properly conducted wet removal projects.

When general monitoring is selected as the most appropriate abatement action, DSB relies on a very simple strategy. First the building custodians are told which areas are to be monitored. Then the custodians are instructed to send in monthly forms to the Asbestos Task Force whether or not damage has occurred to the asbestos-containing material. If the damage is nontrivial, plans are made to enclose the problem area.

B. Abatement Costs

DSB has compiled a list of unit costs (Table 5) for the various abatement options. These unit costs are based on average contractor bids for the 1981 summer abatement period. The monitoring unit cost in Table 5 is based upon the time required for a building custodian to inspect the areas in question and to fill out his monthly report to the Asbestos Task Force.

Table 5. Abatement Unit Costs

Abatement option	Unit cost ($)
General monitoring	15.00/month per building
Sealing	2.85/ft^2
Encapsulation	3.50/ft^2
Containment	7.75/ft^2
Removal/replacement	7.00/ft^2

Abatement options are defined in the opening paragraph of Section V.

DSB has found that the unit prices listed above are generally lower than the unit prices encountered by the Asbestos Task Force when the program first began. DSB assumes that this modest decrease in unit costs over time is a reflection of increased experience of contractors with asbestos abatement work and increased competition among these contractors. The unit prices listed above include preparation of work areas, "clean rooms," and showers (where required), and at least two thorough wet cleanups. An allowance in the abatement contracts was also made for the costs of air sampling and analysis via phase contrast microscopy before, during, and after the abatement work. DSB assumed air monitoring costs of $2,500 for a removal project and $750 for a containment project. These total costs are based upon a unit cost of approximately $350 per day.

Total abatement costs were financed by the City of New York, as part of the capital budget. Recently, the Education Department of the State of New York allocated $3.5 million for abatement activities; the DSB has received a portion of these funds. However, the City of New York's total cost for asbestos abatement in schools is expected to reach $10 million by September 1983.

VI. RECORDKEEPING AND REPORTING

DSB's documentation of their asbestos control program included master files and large series of building-specific files. The master files or "record books" contain all bulk sample analysis results (3,800 analyses of primary or split samples from 2,100 building sites). The sample record book is organized by sample number; the five borough books are sorted by district and school. A unique sample identification number, the borough name, district number, and school name are included in each of the six record books along with the laboratory results. The master files also indicate which samples were split for multiple laboratory analyses. Each of 1,411 building-specific files contain survey sheets, correspondence, and abatement specifications if they were required. Thus, if there are questions about the type of asbestos-containing materials presently in a given building, or questions about the need for abatement activity, the Task Force will be able to document their understanding and current recommendations.

Appendix A contains the asbestos exposure algorithm form and an example of the pressure sensitive label applied to the bulk sample canisters. The overall progress of the DSB asbestos control program is documented in a series of memoranda from the Executive Director of DSB to the Chancellor of the New York City Board of Education. These memoranda are included in Appendix B. An example of a summary form from the building-specific files is included in Appendix C, and an example of the initial asbestos survey instructions and data forms are included in Appendix D.

After abatement decisions were made, DSB had to select qualified contractors to perform portions of the abatement work. Appendix E contains two forms used to evaluate the performance of abatement contractors. The first

form is filled out by a DSB inspector/construction supervision who periodically visits the work site. The second form is used by Asbestos Task Force personnel when they want to compare the performance of several current contractors prior to award of additional abatement contracts.

If the asbestos-containing material was undamaged and relatively inaccessible, general monitoring might have been selected as the abatement option. Appendix F contains a series of items used to monitor the status of asbestos-containing materials left in schools. The first item is a warning stamp, which is applied to the relevant pages of the custodian's logbook. This logbook must be signed by all contractors before they begin work of any type in the school building. The second item is a sample form and instructions for completing it, to be filled out by custodians to report changes in asbestos-containing materials over time. The final item is a warning sticker, which is placed in school buildings to warn mechanics, specification writers, inspectors, designers, and custodial personnel to check with the custodian before working. The purpose of this sticker is to minimize the intensity of asbestos exposures when routine maintenance or renovation is carried out.

A number of additional reports or memoranda document the activities of the Asbestos Task Force. Progress reports were sent to all District Superintendents and to DSB's Executive Director soon after specific schools were surveyed. The report to each District Superintendent listed the schools in the district with asbestos-containing materials, the types of material present, the material's location, the appropriate method of abatement, and an abatement action schedule. An asbestos information sheet was also sent to all schools with positive bulk sample results. This information sheet was mounted in a red frame and placed on the wall of each Custodian's office. The information sheet lists the locations of asbestos-containing materials in the school,

the type of materials, the appropriate method of abatement, and when abatement was completed or scheduled.

In summary, DSB's approach to recordkeeping for the asbestos program was to adequately describe the asbestos problem in each school and to document each recommendation and action. The documentation had to be sufficiently detailed so that subsequent questions about any previous action could be answered accurately .

VII. NEW YORK CITY PROGRAM RECOMMENDATIONS

This section contains recommendations from the NYC asbestos-in-schools program that may be useful to other school officials faced with similar asbestos exposure problems. The recommendations in this section deal with public relations, building inspection, bulk sampling, laboratory quality control, abatement options, abatement costs, recordkeeping, and asbestos waste disposal.

A. Public Relations

DSB's principal recommendation concerning public relations is that school administrators should be candid when they are confronted with a potential asbestos problem. Parents, teachers, students, custodians, and representatives of the press should be given the best available information so that everyone concerned will appreciate the true extent of the situation without undue alarm. It should be made clear that laboratory analyses are needed to ascertain the presence of asbestos-containing materials, and that no single abatement option is appropriate for all asbestos sites. Moreover, the selection of an abatement option is a complex process in which the adverse health risks associated with inadequately characterized asbestos exposures (the status quo) must be balanced against the monetary costs of the available abatement options.

B. Building Inspection

DSB's experience suggests that the most effective way to identify all areas of concern is to conduct an extensive visual survey in all school buildings. The individuals conducting the survey should be trained to recognize materials that may contain asbestos. DSB suggests that the visual inspectors should look above suspended ceilings for spray-on fireproofing or old acoustical materials in addition to noting the characteristics of the visible ceiling material and the wall coverings. Spray-on fireproofing materials are likely to be present throughout a school if they are present at all. Acoustical

materials are most likely to be found in libraries, lunchrooms, corridors, swimming pool areas, auditoriums, music rooms, kindergartens, and in sound control rooms.

C. Bulk Sampling

Bulk samples of suspicious materials can be collected immediately after each space is visually inspected, or the bulk samples can be collected on a subsequent visit to the site. The choice between these two data collection options may be guided by resource constraints. If the school system is large, and the funds available for the analysis of bulk samples are limited, it may be desirable to visually inspect all spaces in each school building before a single bulk sample is collected. A list of suspicious areas and their dimensions keyed to school floor plans should be compiled. After the scope of a potential asbestos problem has been tentatively defined, rational decisions about the number and location of bulk sampling sites can be made.

The first bulk samples should be taken from suspicious materials present in many spaces throughout a school or in a series of schools. Yet it should be recognized that material with a similar appearance across spaces or schools may not have a uniform asbestos content. The EPA has published a description of a simple statistical sampling procedure (USEPA 1980a) that minimizes arbitrary and unsystematic bulk sample collection. It is desirable to have an unbiased estimate of the amount of asbestos present in suspect material so that appropriate abatement decisions can be made. The statistical sampling procedure was designed so that potential bias will be minimized and the best abatement decision will be made. DSB specifically recommends that samples of acoustic plaster should be collected at three different locations in the same space or room prior to splitting for laboratory analyses.

When bulk samples are collected from a specific location, the physical characteristics of the sampling site should be recorded on a standard form. This information is important because the presence of friable asbestos-containing material in a given school space may not necessarily imply that the air in the school space has a high concentration of asbestos. Friable asbestos-containing material may increase the concentration of airborne asbestos only under certain conditions (e.g., when the friable material is severely damaged).

DSB recommends that particular attention be paid to the general condition of the suspect material, to the proportion of the material directly exposed to building occupants, and to the level of human activity in the area. DSB also feels that materials with a higher percentage of asbestos are of more concern than materials with a lower percentage. DSB's rationale for highlighting condition, exposure, and activity is the reasonable assumption that these three factors should be associated with fiber release and the concentration of airborne asbestos.

D. Laboratory Quality Control

DSB recommends that the qualifications of laboratories performing bulk sample analysis be checked. Polarized light microscopy with dispersion staining is the analytical technique of choice. DSB suggests that the laboratory should be questioned in writing about the background of the analysts who will be working with the samples. DSB also suggests that some bulk samples should be split into thirds. Specifically, the first third should be stored for reference purposes and the second and the third should be sent to different laboratories for analysis. The EPA has supported a laboratory proficiency program (USEPA 1981 and Lentzen et al. 1981) that will help minimize the problem of laboratory error in estimates of the bulk sample asbestos percentage.

A list of participating commercial laboratories is available from the EPA. (Call 1-800-334-8571 and ask for Gene Brantly or Don Lentzen.)

E. Abatement Options and Costs

The selection of an appropriate asbestos abatement option exemplifies decisionmaking in a context where all the needed scientific information is not available. Thus, DSB prefers to rely on the judgment of experienced Asbestos Task Force members instead of on an arbitrary exposure score when abatement decisions are made. Abatement decisions cannot be based upon rigid rules given the state-of-the-art of asbestos exposure measurement in schools.

With the benefits of hindsight, DSB is presently recommending removal instead of encapsulation for highly friable, accessible materials with a high percentage of asbestos. Encapsulation should only be used where the materials are structurally sound and well bonded to the substrate and removal is essentially impossible. If water damage is possible, another abatement option should be considered. The penetrating type of encapsulating agent is superior to a surface-coating agent because the bond to the substrate is usually improved. As just noted, DSB recommends removal as the best abatement procedure for highly friable and accessible material with a high percentage of asbestos. During removal, the material should be thoroughly wetted before it is scraped off the ceiling or wall. The pieces of wetted asbestos-containing material should be picked up and bagged continuously as the removal operation proceeds. Inaccessible asbestos-containing acoustic plaster in excellent condition should be sealed with several coats of high quality latex paint because the water base penetrates the material and preserves acoustic properties. Accessible or damaged asbestos-containing acoustic plaster should be contained with a gypsum board and acoustic tile barrier. A building identification and monitoring system should also be set up to ensure that nonproblem areas do not change

into problem areas in the future. DSB's experience indicates that school systems should expect unrealistically high or low bids for abatement work until area contractors acquire the necessary experience.

F. Recordkeeping

DSB's experience also suggests that the original scope of the asbestos problem should be described in detail in writing. Moreover, subsequent abatement decisions should be defended on paper. Investments in detailed recordkeeping will pay for themselves by improving public relations when a concerned parent, teacher, or reporter asks about what was done in a particular school.

G. Asbestos Waste Disposal

DSB recommends that State and Federal authorities become more directly involved in the proper disposal of asbestos waste. DSB has discovered that many landfill operators are refusing to accept the waste generated by asbestos removal projects. Thus, DSB suggests that States should designate asbestos waste disposal sites on State-owned property.

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Appendix A

Asbestos Exposure Algorithm Form and Bulk Sample Canister Labels

ASBESTOS PRIORITY SURVEY

INSPECTOR

DATE OF INSPECTION

SCHOOL / BORO _____ DISTRICT _____

USE VALUES LISTED IN INSTRUCTIONS (REVERSE SIDE). LEAVE LAST 2 COLUMNS BLANK

SPACE OR ROOM NUMBER	REMARKS	ACTION R/E/C	MATERIAL F.P.	MATERIAL SOFT AC.	MATERIAL AC. FL.	HUNG CLG BELOW F.P. YES	HUNG CLG BELOW F.P. NO	(A) CONDITION DAMAGE 0·2·5	(B) WATER DAMAGE 0·1·2	(C) EXPOSED SURFACE 0·1·4	(D) ACCESS. 0·1·3	(E) ACTIVITY/ MOVEMENT 0·1·3	(F) PLENUM OR AIR STREAM 0·1	TOTAL (SUM OF (A) THRU (P))	FRIABILITY 0·1·2·3	% OF ASBESTOS 0·1·2·3	PRIORITY FACTOR

ACTION RECOMENDATION - R = REMOVAL E = ENCAPSULATION C = CONTAINMENT

SHEET _____ OF _____

A-3

INSTRUCTIONS

A. CONDITION/DAMAGE

Combination of adhesion to substrate, deterioration and physical damage. Do not consider water damage.

None..... 0
Superficial damage, or small area of disruption ..... _
Widespread, severe or large pieces dislodged..... 5

B. WATER DAMAGE

Visible water stains, or dislodged material due to water.

None..... 0
Minor or Small areas only..... 1
Moderate to major leaking..... 2

C. EXPOSED SURFACE

NOTE: Grids, or other open ceiling systems should be considered exposed. Exposed does not mean accessible.

None (all areas behind hung ceiling)..... 0
Less than 10% exposed..... 1
Over 10% exposed..... 4

D. ACCESSIBILITY

If material can be reached by occupants, custodial or maintenance personnel, it is accessible.

Not Accessible..... 0
Low: Rarely Accessible..... 1
Moderate to High: Access may be frequent..... 3

E. ACTIVITY/MOVEMENT

Activity by students and custodial or maintenance personnel, machinery and structure vibration.

None or Low (libraries, most classrooms, some custodial spaces).. 0
Moderate (Some classrooms, corridors, auditoriums)..... 1
High (Some corridors, student cafeterias, gymnasium/playrooms)... 3

F. PLENUM OR DIRECT AIR STREAM

Is material located in an air plenum (space between hung ceiling and slab above used for air circulation) or in path of direct forced or mechanical air stream?

No..... 0
Yes..... 1

TOTAL SUM

The total sum of values noted in Column A through F.

FRIABILITY

Very important factor.

None or Questionable..... 0
Low: Difficult but possible to damage by hand. Penetration of material by tool or coin..... 1
Moderate: Fairly easy to dislodge and crush..... 2
Highly Friable: Easy to dislodge, separate. Fibrous or fluffy... 3

PERCENTAGE OF ASBESTOS

Less than 1%..... 0
1% to 5%..... 1
6% to 50%..... 2
51% and over..... 3

*Algorithm Score = (Sum of A to F) x (Friability) x (% Asbestos)

SCHOOL_____ DIST _____

MATERIAL _____

LOCATION _____

TAKEN BY: _____ DATE _____

SCHOOL_____ DIST _____

MATERIAL _____

LOCATION _____

TAKEN BY: _____ DATE _____

Appendix B

Memoranda from the Executive Director of the Division of School Buildings to the Chancellor of the Board of Education

BOARD OF EDUCATION
OF THE CITY OF NEW YORK
110 LIVINGSTON STREET
BROOKLYN, N.Y. 11201

FRANK J. MACCHIAROLA
CHANCELLOR

November 8, 1978

MEMORANDUM

TO: Members of the Board of Education

FROM: Frank J. Macchiarola

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM #1

Attached for your information and review is a copy of Memorandum No. 1, Asbestos in School Buildings, November 6, 1978, prepared by Anthony Smith, Executive Director, Division of School Buildings.

I will brief the Board of Education on the course of action we are taking regarding inspection of facilities and resolution of problems.

FJM:cms
Attachment
cc: Mr. Halverson
Mr. Siegel (2)
Ms. Brownell
Mr. Wirtz
Mr. Bogart

To date, the following has emerged in connection with the 1976-77 survey:

1. Asbestos was used for fire retardation and sound proofing in many buildings built prior to 1971;

2. Approximately 185 buildings were listed as containing asbestos bearing material used and/or located in such a way as to be visible and accessible in the normal use of the building. Because that material was accessible, it was vulnerable to being dislodged or disturbed.

3. In eleven (11) schools, because of a combination of the materials used and the location of those materials, it was decided that the materials themselves would have to be physically removed. (Originally, this list was longer; subsequent investigation changed and shortened it.)

4. Of these eleven (11) schools, work has been completed in three (3);

5. Contracts have been awarded in another six (6) schools. Two contracts have to be rebid. We will work closely with the Community School Boards, District Superintendents and Principals to insure the most expeditious and least disruptive schedule on which to complete this phase.

6. As indicated in the December 1977 report, the four phases into which the initial program has been prioritized are as follows:

   I. Instructional areas, assembly areas, and swimming pools with fluffy, spray-on soundproofing and/or fireproofing;

   II. Locations with damaged, but basically harder, denser, stronger acoustical plaster;

   III. Undamaged areas of the same type of hard, dense plaster;

   IV. Boiler Rooms, machinery rooms, etc. with spray-on soundproofing or fireproofing (and not generally accessible).

Only in the case of light, fluffy, more breakable and fully exposed material is physical removal indicated (phase I).

It should be noted that in most cases, the asbestos containing materials used in our buildings are quite dense and quite strong and, therefore, are susceptible to sealing with spray and/or other materials.

Technical and medical experts generally favor sealing and/or structural containing of that type of dense asbestos, as opposed to removing it physically.

II. P.S. 185-208

You should also know that the situation recently encountered at P.S. 185-208 in Manhattan was not included in the program because the condition was being corrected by replacement of the missing ceiling tile. Specifically, P.S. 185-208 involves a type of construction in which the steel beams, coated with the sprayed on asbestos-bearing fire retardant, are located above a suspended ceiling and were considered sufficiently protected to assume that the asbestos-bearing material could remain intact (undamaged). At this writing, we do not know the extent to which this type of condition may exist elsewhere. It exists at P.S. 185-208 only because the suspended ceiling on several floors and in several locations was severely damaged. The result of this damage means that the heretofore isolated asbestos-bearing fire retardants are now visible. Visibility does not have to mean that we have a hazardous condition. We are examining the school intensively to determine what must be done to protect the health and safety of all those who use this building.

III. PLANNED ACTION

1. We intend to inspect every school in the Board's system.

2. Based on data available to us and developed over the next few weeks, we will establish priorities for inspection and then sealing and/or containing asbestos-bearing materials based on the extent to which they are accessible and vulnerable to disturbance and/or have already been disturbed. In those few cases, eleven now identified (and three already accomplished) where removal is the most prudent course of action, we will expedite it.

3. Our greatest need for information now is the number of schools which have the type of problem identified at P.S. 185-208: originally concealed material now accessible and therefore susceptible to damage. To acquire this information, I will be meeting, on November 6th, with the custodians from the more than 240 schools constructed during the period (1960-1971) when asbestos might have been used in this manner. (Please note: not every school built between 1960 and 1971 contains asbestos as a fire retardant). The custodians will be asked to return to their schools and, as quickly as possible, survey all suspended ceilings which have been damaged and to report the extent to which any type of fire retardant material is visible on the steel beams which can now be seen through those damaged suspended ceilings. We will not be asking the custodians to make a judgement as to whether the material they can see contains asbestos, nor whether the material they are looking at has been physically disturbed.

Also, on Monday, November 6th and Tuesday, November 7th, a team of New York City Health Department Sanitarians and Air Resource Bureau Inspectors will be trained by Dr. William Nicholson of Mount Sinai Hospital in detecting damage to sprayed on fire retardants caused by such disturbance as vandalism and water leakage.

BOARD OF EDUCATION OF THE CITY OF NEW YORK
OFFICE OF SCHOOL BUILDINGS
29-11 BRIDGE PLAZA NORTH
LONG ISLAND CITY, N. Y. 11101
TELEPHONE: EMPIRE 1-7711

November 6, 1978

TO: Dr. Frank J. Macchiarola

FROM: Anthony R. Smith

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM #1

We have a problem with asbestos. We do not have an emergency. This report will summarize for you what we know so far, and what the planned course of action is.

I. BACKGROUND

There is an increasing public awareness of the existence and use of asbestos in the construction of many buildings of all types, including school buildings. Initially, concern focused on those who had actually worked with or near asbestos; more recent attention is being given to those whose academic, professional and residential environments are located in structures which contain asbestos-bearing materials. In all cases, the concern has been caused by the proven relationship of certain types of disease which have been contracted by those who have worked with high concentrations of airborne asbestos fibers over long periods of time.

The evidence to date is that the disease occurrence is related to high levels of airborne asbestos fiber concentrations existing over many years. There is nothing in our school system which bears any relationship to such a condition.

Nevertheless, the concern is completely understandable. Our program of action is geared to attack the cause of the concern.

From late 1976 and into 1977, the Division of School Buildings, with the assistance of the New York City Department of Air Resources and the Mount Sinai Hospital Environmental Health Laboratories, conducted a survey of Board of Education buildings to identify any school which might have a potential or actual health problem caused by asbestos being accessible, and therefore susceptible to being damaged. Technical experts state that only when disturbed in some way do fibers become airborne; medical experts state that only when airborne can the fibers be inhaled; and, they note, only when they are inhaled in concentrated fashion over prolonged periods of time, does it now appear that one of several asbestos-caused diseases can be contracted. Such diseases may not appear, or be detectable, for twenty or thirty years after exposure.

4. Using the data from the custodial survey to set our order of inspection priorities, (i.e., the most severely damaged suspended ceilings, with the most visible fire retardant will be highest priorities) the Health and Air Resource Inspectors will begin making the rounds of the schools where asbestos might have been used in its basic construction process.

5. During this inspection period, we will be putting up for bid and awarding as quickly as possible, contracts for the sealing and/or containing of materials containing asbestos identified in the survey made in 1976-77.

6. We will also be developing technical specifications for new types of much stronger suspended ceilings to be installed in place of the easily damaged acoustical tile ceilings which led to the problem typified at P.S. 135-208.

Inquiries, other than press, should be directed to Mr. Bernard Lakritz at 361-7711. I have designated Mr. Roger Chiljean of this Division, as the over-all operational coordinator for all aspects of this program. He has my complete confidence.

I am not able, yet, to give you either a construction time-frame or dollar estimate. Obviously, the complete program will far exceed the $3,000,000 earmarked in the Capital Budget for the covering of the acoustical material.

We intend to have our first priority school inspections completed within three weeks and I would hope we would have the full survey of all Board of Education facilities completed by late February, 1979.

ARS:mmj

BOARD OF EDUCATION OF THE CITY OF NEW YORK
OFFICE OF SCHOOL BUILDINGS
28-11 BRIDGE PLAZA NORTH
LONG ISLAND CITY, N. Y. 11101
TELEPHONE: EMPIRE 1-7711

November 15, 1978

TO: Dr. Frank J. Macchriarola

FROM: Anthony R. Smith

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM #2

Our survey of schools which are known to or which may contain asbestos continues. Approximately one half of the schools which we are surveying on a priority basis have now been examined by either a representative of the Department of Health or the Bureau of Air Resources of the Department of Environmental Protection. To date none of those surveys has revealed a condition which would dictate the closing of all of or portion of any school. The only exceptions to that previous statement are two swimming pools, one at Franklin K. Lane High School, where removal work commenced on November 14; and a swimming pool at Bushwick High School which has a ceiling similar to that of Franklin K. Lane and which, I believe, could be a potentially hazardous environment until the ceiling has been removed.

The task ahead. We must now concentrate our efforts on locating "friable" material. Material "friable" can be crushed easily in the hand. When we have located friable material, we must then have it analyzed to determine whether or not it contains asbestos. (N.B.: Material can be friable, sprayed on and used for acoustical purposes, and contain cellulose rather than asbestos.)

The determination of friability is relatively uncomplicated. If it were not for the number of schools and the size of some of our schools we could have it done in a very short period of time. It will take longer because of the size and scope. Friable material will now be taken in bulk samples (bulk in this case meaning something that would fit into a container the size of a 35 mm. film can). It will then be analyzed using highly sophisticated techniques which are available in only a handful of laboratories in the United States.

When we have determined with certainty that the friable material does contain asbestos, a determination will be made as to what is the most responsible way to isolate that material from entering the regular environment of the school.

There are two basic approaches:

1. Removal. Depending on the degree of "friability" and evidence that the material has been damaged or accessibility to potential damage, we will consider removal. Removal has taken place in several schools. Removal was indicated in the December 1977 report for 11 schools. Our recent survey has indicated that removal may not, in fact, be appropriate in every one of those cases. Removal procedures are spelled out with great precision in recent documents published by both the Federal Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA). The technology and the guidelines and the experience all exist to insure that removal can be done in such a way that it is safe for those engaged in the labor, and it is safe for those who will use the building after the removal is completed. We must insure, of course, that our own work force and any contractor who works for us on a removal project not only understands but is in complete compliance with everyone of these regulations.

2. Containment. Containment can take three forms: (1) A sealant can be sprayed on the asbestos containing material; (2) The material can be isolated from the environment using structural materials. Depending on the situation, this would range from a simple plywood barrier to a more complicated ceiling to replace an existing suspended ceiling when the first ceiling might not be strong enough to prevent damage and therefore access to a fire retardant above it; (3) A combination of sealant and structural containment.

   We are attempting now to develop criteria and guidelines to assist us in making decisions as to which one of the preceeding alternatives is appropriate in any given situation. One of our problems in determining the basic decision, removal versus containment, lies in the nature of the asbestos material itself. In one school, for example, we might find a fairly friable asbestos containing fire retardant which was so well bonded to the steel beams that either a sealant and/or structural containment would be indicated. In another school, we might find the fire retardant not bonded well enough to the steel for us to feel comfortable in recommending anything other than removal. The situation will vary on a case by case basis.

What the above indicates is the need for a well trained and well disciplined cadre of personnel within the Division of School Buildings who can supervise contractors and our own work force whenever they are working in, around, or with asbestos containing materials. We are establishing such a program.

Timetable. You and members of the Central Board, members of local Community School Boards, concerned parents and many representatives of the media have repeatedly asked when all of these things which need to be done will, in fact, be done. I regret I cannot yet give you a definite date. The challenge

which confronts us, is now assuming manageable proportions. We know what we have to do. We know how we have to do it. We are getting increasingly expert advice and assistance from individuals who have been down this road before, either as active participants in removal and containment programs in other jurisdictions, or as consultants and advisors to those who are involved in removal and containment. Because of that counsel, I am increasingly comfortable in saying that the tech. logy is available and it is available to us. Our two obvious problems a e time and the magnitude of the work which must be done in so many of our schools. When we know the answers to those two questions we will then be able to provide you with an estimate of the total cost. I am hoping that in my next report I will be able to answer some of these profoundly important questions.

ARS:ss

BOARD OF EDUCATION OF THE CITY OF NEW YORK
OFFICE OF SCHOOL BUILDINGS
28-11 BRIDGE PLAZA NORTH
LONG ISLAND CITY, N.Y. 11101
TELEPHONE: EMPIRE 1-7711

MEMORANDUM

November 22, 1978

TO: Frank J. Macchiarola, Chancellor

FROM: Anthony R. Smith

SUBJECT: Asbestos in School Buildings - Transmittal of memorandum #3

Attached is my latest memorandum on the asbestos situation in our schools.

Not included in that memorandum is the fact that we have invited all non-public school associations to be briefed and kept in contact with us on dealing with asbestos in schools.

A meeting was scheduled for 10:00 A.M. today, Wednesday, November 22 at my office.

All non-public school associations were invited to attend. Representatives of only two, the Archdiocese of New York and the Archdiocese of Brooklyn, attended this meeting.

In the future, should there be additional information to pass on we will of course, extend again the invitation to all of those non-public school associations who may wish to be further briefed.

You should also know that we intend to announce that whatever we do at 185/208 will be done in the form of a work shop/laboratory and we will invite representatives of all non-public school associations, contractors who are duly registered with the Board of elsewhere in the city, who may wish to observe removal, sealant or containment operations, as well as our senior supervisory personnel from throughout the city to observe the techniques used to properly seal and properly contain asbestos containing materials.

The announcement of that plan will be made public when we know precisely what we are going to do, who is going to do it, and when the work will be undertaken.

I am increasingly persuaded that we can significantly shorten the 100 day estimate for the work to be done at 185/208, but I am not yet sure just how much shorter we can make it.

BOARD OF EDUCATION OF THE CITY OF NEW YORK
OFFICE OF SCHOOL BUILDINGS
28-11 BRIDGE PLAZA NORTH
LONG ISLAND CITY, N. Y. 11101
TELEPHONE: EMPIRE 1-7711

M E M O R A N D U M

November 22, 1978

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #3

When I wrote memorandum #1 on November 6, 1978, I stated that, "We have aproblem with asbestos. We do not have an emergency." The events, the information and the expert counsel I have received in the previous two weeks confirm the appraisal of the situation which confronts us to be the same as that presented to you in memorandum #1.

Survey Results. Our initial phase of surveys was to cover 400 schools and other facilities of the Board of Education. As of November 21 we have completed 361 (90%) of those surveys. The preliminary results are as follows:

1. Acoustical plaster of some type was found in 281 (of the 361 schools);

2. Spray-on fireproofing (non-concrete) was found in 73 schools;

3. In 47 of the 73 cases the spray-on fireproofing existed in areas used by teachers and students (and in most, but not all, cases was either contained behind a suspended ceiling or was intended at the time of contruction to have been so contained);

4. In 26 of the 73 cases where spray-on fireproofing exists, it appears to be located only in custodial areas and is therefore accessible only to a trained, technical staff;

5. 241 schools contain either acoustical plaster and/or spray-on fireproofing.

In other words, as of this writing, 241 schools represents the total known universe of schools which have acoustical or fire retardant material which is either known to contain or which appears likely to contain asbestos.

Having established a known universe the next step is quickly to establish repair priorities. The repair priorities were described in memorandum #2. Briefly, to recapitulate:

1. Determine if the material is "friable" (that is crushable in one hand);

2. Determine if the material contains asbestos (which can only be done through laboratory examination of a bulk example and there are only a few labs and very few scientists qualified to run these tests.

3. If the material is friable, and if the material contains asbestos then if the material is visible, is it accessible? If it is visible and accessible has it been disturbed? On friable material marks indicating disturbance are clearly obvious;

If the answer to all of those points above is in the affirmative we have a situation which requires a priority action. That action, as noted in the previous memorandum may include: removal; spraying on an a sealant; or structural containment (in some cases with a sealant applied before hand, and in some, perhaps most, cases without a sealant having been previously applied.

Comment: Based on more and more consultations with experts in the field, I am increasingly persuaded that in most cases only structural containment is highly appropriate. This is particularly true where there is an opportunity to structurally contain and isolate from the useable environment by installing a strong suspended ceiling.

Outside Consultants: In the past week, we have been most fortunate to have had the services for on-site inspections and consultation of several of the nations experts on asbestos problems:

1. Dr.Robert N. Sawyer, M.D. Dr. Sawyer has now spent two days in the past week assisting us. He has come down from his regular position at the Yale University Health Service in New Haven Connecticut. He is an engineering graduate of M.I.T. and has his MD from Case-Western Reserve University in Ohio. He is an expert on occupational and preventive medicine, cancer, and specifically on asbestos problems of all types, focusing on the problems of asbestos in academic institutions. He is viewed and used by the Federal Environmental Protection Agency (EPA) as its principal consultant from the medical field on asbestos associated diseases and "asbestos abatement" problems and solutions. He is fully aware of the engineering and medical challenges in dealing with asbestos on the one hand, as well as the public policy issues of explaining what asbestos is and is not, and the kind of fear engendered by asbestos among students, teachers, parents, and the public at large.

2. Mr. Larry Dorsey, who is one of Federal EPA's lead Project Directors on asbestos problems, joined Dr. Sawyer and me on November 21 for a tour of several schools;

3. Mr. Glen Murdoch, a private contractor in Connecticut who has worked on many asbestos containment and removal jobs also toured several of our schools late last week and provided his insights into the nature of the work to be done.

Please note that all of the above named consultants gave of their time freely to the Board of Education; while obviously, we would have expected such assistance from the Federal EPA, I am deeply grateful for the generous amount of time which both Dr. Sawyer and Mr. Murdoch gave to the Board of Education.

Dr. Sawyer's basic philosophy in dealing with asbestos can be put rather simply: if the material contains asbestos, if it is friable, if is is visible, if it is accessible, I have already described above what the alternatives are and they will depend on each situation. The correlation is also true: if any one of the above points is not answered in the affirmative, in most cases the asbestos containing material can be left where and as it is. The advice is concurred in by Mr. Dorsey and does indeed represent the most expert guidance and counsel which exists in this country today on the subject of asbestos.

Specific examples of alternate "abatement" alternatives might include:

1. 185/208. The primary problem at 185/208 is asbestos containing fire retardant spray-on steel beams. As you know, it was not intended to be exposed and has been exposed because of a rather poor type of suspended ceiling which had been badly damaged. Keeping in mind Dr. Sawyer's overall philosophy and specific engineering and medical approach, in this case, for example, he strongly recommends structural containment. This means installing a strong plaster board (Sheet Rock-type) material with acoustical tile glued to it. This new suspended ceiling will create a tight, strong containment and will effectively isolate the asbestos containing material from the useable environment of the school. (He does recommend spraying a sealant on the exposed asbestos on the beams of the fan room, since there is no suspended ceiling in that room). It should be noted that Dr. Sawyer in making this recommendation is speaking not only for himself but he is authorized to and was, in fact, speaking for the Federal Environmental Protection Agency in making this recommendation.

2. We saw several different types of problem or potential problems at Susan E. Wagner High School on Staten Island. There are several laboratories in which the students sit at different level tiers and for several of those tiers, the ceiling was very low, (well under six and a half feet). The ceiling tiles had been damaged, leaving, in one case, exposed spray-on fire retardant. (Asbestos assumed, pending laboratory examination). Those rooms were prudently closed by the principal and the Parents Association. They will remain and

they should remain closed until action has been taken to isolate those steel beams from the environment of that room. Again structural containment will do the job.

3. I.S. 33 - Brooklyn. This is a Junior High School built in the mid-1950s. It contains a large amount of acoustical plaster, which, pending lab work, appears of likely to contain asbestos. In most of the schools the application of glued-on acoustical tiles should be an effective containing barrier to isolate the acoustical plaster from the academic environment. There are two or three locations, however, where the plaster has been so badly damaged that removal is indicated. Fortunately, the areas are small and are fairly easy to isolate until that work can take place.

To be candid it is likely that there will be some that resist the idea of structural containment, (as opposed to removal) particularly one that has not been accompanied by the application of the spray-on sealant. I believe, however, that where indicated this is a responsible, safe, and relatively rapid way of dealing prudently and effectively with the problem.

The inherent problems associated with either removal* or spraying on* a sealant will far outweigh any advantages, except where containment is not sufficient, given the nature and/or location of the material. Each situation (that is, not only each school, but each use and location within each school) will have to be decided on a case by case basis, using the Sawyer "yes-no" set of questions on friability and accessibility.

*Specifically, the more of either that is done the greater likelihood of stirring up and releasing fibers into the air.

BOARD OF EDUCATION OF THE CITY OF NEW YORK
DIVISION OF SCHOOL BUILDINGS
28-11 QUEENS PLAZA NORTH
LONG ISLAND CITY, N.Y. 11101
TELEPHONE: 361-7711

MEMORANDUM

November 29, 1978

TO: Frank J. Macchiarola, Chancellor

FROM: Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #4

Because of the long Thanksgiving holiday period, there have been no major changes in the data since the report of last week.

185/208

On Tuesday, November 28 I met for several hours with representatives of the District 3 School Board, the Community Superintendent, and concerned parents, primarily from 185/208. The purpose of the session was to discuss my recommendation that the appropriate, responsible, and most effective way of isolating the asbestos containing fire retardant from the useable environment of those two schools is through the emplacement of a strong structural barrier: a sealed suspended ceiling made of half-inch plaster board with three quarter inch acoustical tiles glued to the plaster board.

I think it is an accurate summary of the consensus of opinion of those at the meeting from District 3 that this recommendation may not be adequate from their current perspective. Were the installation of this stronger ceiling preceded by the spraying-on of an encapsulating agent, some of the parents and members of the board who were present would, perhaps, feel that a more appropriate approach had been taken.

I described to those present how I had reached the recommendation of using a strong structural barrier and that it reflected the expert counsel I had received from Dr. Robert N. Sawyer of Yale, Mr. Larry Dorsey of the Federal Environmental Protection Agency, Dr. Sawyer's assistant (a micro-biologist), and a construction contractor from New Haven who has had considerable experience in the "abatement" of asbestos problems of various types.

I told them that there were effectively three options open to us:

1. Removal. This option would require not only the complex task of, in effect, hermetically sealing the area where the work was to take place, it would also require the additional time, material and expense of replacing the fire retardant which was removed.

2. Encapsulation with a strong structural ceiling. I stated that one of the major problems with encapsulation, and the reason that I will recommend it be used only in circumstances where no other option is available, is that the physical application of the sealant probably disturbs the asbestos containing fire retardant more than any other action we could take, including physical removal. The reason for this massive disturbance potential is that during removal operations, the fire retardant is thoroughly wetted down before removal. The liquid encapsulating agent, however, is sprayed on, with the fire retardant material dry, and the liquid under a pressure of 40 pounds per square inch, which can disturb and disrupt any loose material which might be on or near the surface. Encapsulating alone is not sufficient in an areas of the building which is actively used by students and teachers. It would be satisfactory in a boiler or fan room where there is no suspended ceiling in the first place and where only technical people are admitted in the second place.

3. Structural Containment. I noted that the overall attempt must be to isolate the asbestos containing material from the useable environment and that a strong barrier, too strong for any child deliberately or accidentally to break through,would accomplish this. There was considerable skepticism and concern as to how sure one could be that the barrier would in fact fully isolate asbestos from the useable environment. The principle concern seems to be that either asbestos fibrills could "leak" through the new ceiling and/or at some point ceiling either could be accidentally broken, broken through vandalism, or in the course of having to make repairs or routine maintenance when one might have to penetrate the ceiling. Here the concern was expressed that asbestos might have accumulated on a ceiling over a period of time and be released, in a rather intense concentration, into the atmosphere of the building. Despite the assurances which I attempted to convey to the assembled group that I had received from the various experts to whom I had put essentially the same questions, the District 3 group was not convinced that the barrier alone would do the job. I told them that as soon as Dr. Sawyer is next in the City that he would be available to answer their questions. Concerned was expressed that Dr. William Nicholson, of Mt. Sinai, had suggested that a combination of encapsulation and structural barriers was the best approach. (Comment: It may be that Dr. Nicholson has expressed that opinion; he has not expressed it to me as the only approach; he has, however, met on at least one occasion with essentially the same group with whom I met on November 28, and it may well be that this is his recommendation. I believe that Dr. Sawyer, who has had extensive "hands-on" experience with removal, encapsulation, and containment and who is also a medical doctor who specializes in carcinogenic substances, specifically asbestos, is probably the most qualified expert, perhaps in the country,

to whom we could turn. I would recommend accepting his advice, were it not in agreement with the recommendation of Dr. Nicholson.)

There were a number in the group who led me to believe that they will not accept a combination of encapsulation and structural containment. They, as I interpreted what they were saying to me, believe that only removal is a safe and appropriate response.

City Council Testimony

On Monday, November 27, I testified before the New York City Council Education Committee for approximately 2 hours. I briefed them on the background, on the current work plans and what we see as the various alternative ways of abating the asbestos problems. I also pointed out that each school, and perhaps sections within each school, will have to be approached as unique and special situations.

Federal Assistance

Federal EPA on November 28, has indicated, through Larry Dorsey in Washington, the beginning of interest in assisting the Board on asbestos abatement. The initial suggestion was quite limited: paying for Dr. Sawyer's consulting fees to conduct a two day seminar in New York City for Board of Education personnel as well as one representative from each of the ten EPA Regions around the United States.

I have suggested and expressed the hope, that perhaps more support and assistance than that might be forthcoming and quickly.

ARS:ss

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

M E M O R A N D U M

December 8, 1978

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #5

Work Plan and Cost Estimates

On Wednesday, December 6 my staff completed its preliminary estimates on the cost of an asbestos abatement program designed, over a period of years, to isolate asbestos from the used environment of schools wherever it is located in such a way that it could enter that environment.

My staff has estimated that the cost of dealing with asbestos used in acoustica' plaster, which we now estimate will turn up in 330 schools, at $23.1 million; in certain cases, removal will be required, as opposed to structural containment, and we estimate that at another $500,000. The largest single expense is that associated with removal, encapsulation, and/or barrier containment of asbestos containing fire retardant. We estimate 72 schools will have that problem and the cost of dealing with it could range from $12 to 24 million.

In summary, the range for dealing with the asbestos problem will be from $35 to 48 million of capital budget funds.

Please note: the above estimates deal only with work on asbestos itself. Other structural problems are associated with asbestos, most importantly water proofing, repair of leaking roofs, and other type of leak problems. As I have noted for you before, water erosion is a serious problem and must be dealt with either before the asbestos is contained or at the same time that process is underway. These types of projects, normally expense budget items, should, of course, become capital budget items as part and parcel of asbestos abatement. Similarly, where major asbestos work has had to be done in corridors and classrooms, painting and plastering, also normally expense budget items, will, in many cases, be part and parcel of the asbestos abatement program as well.

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ANTHONY R SMITH
EXECUTIVE DIRECTOR

M E M O R A N D U M

December 19, 1978

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #6

Survey Results

A team of inspectors from the Division of School Buildings is currently visiting selected schools. They are: 1) Taking bulk samples for analysis of asbestos content in all schools having acoustic plaster, sprayed on fireproofing or acoustic material; 2) Inspecting schools that have been added to the original lists either because of modernizations or the years the buildings were constructed; 3) Re-inspecting selected buildings where previous reports may have indicated conflicting information. It is expected this task will be completed by December 22, 1978.

Samples are being delivered to this office. They are being sorted and split (so that we can retain a portion of the sample) and will be sent to laboratories for a qualitative and quantitative analysis.

Program Progress

Preparations are underway to enable work to be performed during the Christmas recess in eleven (11) buildings by using our in-house mechanics. The method of corrective work employed will be to paste on acoustic tiles to the acoustic plaster. This method of containment has been discussed with Dr. Sawyer and met with his approval. Preparation of contracts has begun.

To update you on progress of work regarding Phase I removal contracts, we provide information on the attached listing. As you recall, this category of work was established to remove all visible (therefore accessible), sprayed-on friable materials used either for fireproofing or acoustical treatment.

ARS:ss
Attachment

My staff is currently attempting a correlation between those buildings with known asbestos abatement problems and those with known water leakage problems in an attempt to determine the final cost of those two now inter-related projects.

City-wide Approaches

Also in connection with asbestos, it should be noted that Dr. Irving Selikoff of Mr. Sinai's Environmental Health Sciences visited P.S. 185/208 on Monday, December 4. He stated, and was quoted in the press as noting, that no two schools will require precisely the same type of asbestos abatement program; and, further within any given school, there may be one or several or combinations of several approaches that are required. I believe that it was important and significant that a man of Dr. Selikoff's eminence has publicly stated this important fact. It should reinforce with the public that the Board's response, so far, has been appropriate and responsible.

185/208

Specifically at 185/208, Dr. Selikoff stated that two, and possibly three approaches are appropriate:

A. Fan Room: encapsulate with a sealant;

B. Auditorium doorways and entrance areas to each school: either contain with a barrier, or remove;

C. Remainder of the building: structural containment.

New Systems

Dr. Selikoff, Dr. Sawyer and I have discussed the critical importance of having a "fail-safe" management control system in place in buildings in which asbestos material has been contained behind an impervious barrier. These are now being developed.

ARS:ss

School	Problem	Progress	Completion Date
Andrew Jackson H.S. Queens	Friable Sound Deadening Material in Pool	Pool Closed	Work scheduled to start Christmas Week. Project completion Jan. 1, 1979
Bushwick H.S. K	Friable Sound Deadening Material in Pool	Pool Closed	Work scheduled to start Christmas Week. Project completion Jan. 1, 1979.
James Madison H.S.-K	Sound Deadening Material Rooms 136, 138 Public Address Room	Spaces locked by custodians. not being used.	Work scheduled to start Christmas Week. Projected Completion Jan. 31, 197
Susan Wagner H.S. K	Spray-on Fire Proofing on Beams and Auditorium Stage	Beams inaccessible. Dr. Sawyer indicated no imminent danger in use of spaces.	Work scheduled to start Christmas Week. Project completion Jan. 31, 197
P 219 Queens	Spray-on Fire Proofing on Beams in Gym and Aud. Stage	Beams inaccessible. Teachers instructed to monitor activities.	Work scheduled to start Christmas Week. Projected comp ½ Christmas Week - ½ Easter Week
Benjamin Cardozo H.S. Queens	Spray-on Fire Proofing on Beams in Auditorium stage and Storeroom	Contractor working - Areas sealed with drop cloths.	Projected completion January 1, 1979
P 126 K	Friable Sound Deadening material in Cafeteria, Band and Music Rooms	Substantially complete - installing Acoustic tile	Projected completion January 1, 1979
Prospect Heights H.S. K	Friable sound Deadening material in Band Practice Room	Substantially Complete - removals complete. Trim around new Ac. tile being installed	Projected completion December 22, 1978.
Franklin K. Lane H.S. K	Friable Sound Deadening material in Pool	Removals complete. Contractors working on finish patching	Projected completion December 22, 1978.

School	Problem	Progress	Completion Date
P 219 K Annex	Spray-on Fire Proofing on Beams	Landlords Contractor substantially complete. Finishing work being completed.	Projected Completion January 1, 1979.
P 158 Q	Painted friable sound deadening material in student cafeteria		Work scheduled to start Christmas Week. Projected completion January 1, 1979.

Thus in summary, of the eleven(11) Phase I projects, five (5) projects have already begun, two (2) are projected for completion by December 22, 1978 and three (3) are projected for completion on or about January 1, 1979. Six (6) projects are scheduled to commence Christmas week, with completion of three (3) projected for January 1, 1979, two (2) for January 31, 1979 and the remaining project to be completed 1/2 during Christmas week and 1/2 during the Easter recess.

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

Reproduced from best available copy.

December 20, 1978

MEMORANDUM

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #7

Our last report, Memorandum #6, was issued on December 19, 1978. Further asbestos abatement activity has been taken since that time. Using our shop mechanics work force, an isolating barrier was created by bonding acoustic tiles to asbestos-containing acoustic plaster in a number of schools. The status of these projects is as follows:

Installations Completed

P 116 M
J 13 M
J 135 X
J 59 Q

Installations Partially Completed

P 191 M
P 44 R
J 214 K
I 33 K
P 58 K
J 277 K

Limited availability of supplies, manpower and duration of the Christmas recess were factors in limiting the scope of work completed to date.

Progress was also made by our contractors on the Phase I asbestos removal projects. Their status is as follows:

School	Problem	Progress	Completion Date
[illegible] Jackson H.S. Queens	Friable Sound Deadening Material in Pool	Pool Closed Asbestos Material removed. Finishing work in progress.	Projected Completion January 31, 1979.
Bushwick H.S. K	Friable Sound Deadening Material in Pool	Pool Closed. Work Started.	Projected completion January 15, 1979.
James Madison H.S. K	Sound Deadening Material Rooms 136, 138 Public Address Room	Spaces locked by custodians. Not being used. Work started.	Projected completion January 31, 1979.
Susan Wagner H.S. K	Spray-on Fire-proofing on beams and Auditorium Stage	Beams inaccessible. Work started.	Projected completion January 31, 1979.
P 219 Q	Spray-on Fire-proofing on beams in Gym and Aud. Stage	Beams inaccessible. Teachers instructed to monitor activities.	Projected completion Spring recess.
Benjamin Cardozo H.S. Q	Spray-on Fire-proofing on beams in Auditorium stage and Storeroom.	Contractor working - Areas sealed with drop cloths.	Projected completion January 6, 1979.
P 126 K	Friable sound deadening material in Cafeteria, Band and Music Rooms.	Substantially complete - installing Acoustic Tile.	Projected completion January 8, 1979.
Prospect Heights H.S. K	Friable sound deadening material in Band Practice Room.	Substantially complete - removals complete. Trim around new Ac. tile being installed.	Projected Completion January 12, 1979.
Franklin K. Lane H.S. K	Friable sound deadening material in Pool.	Removals complete. Contractor working on finish patching.	Projected completion January 12, 1979
P 21[illegible] K Annex	Spray-on Fire-proofing on beams.	Landlord's contractor substantially complete. Finishing work being completed.	Projected Completion January 2, 1979.
P [illegible] Q	Painted friable sound deadening material in Student Cafeteria.	Work performed during Christmas recess.	Completion January 2, 1979.

Thus, in summary, of the eleven (11) Phase I projects, work has been performed on ten (10). Two (2) of them will be complete on January 2, 1979. Eight (8) others will be completed during January. One (1) project is scheduled for completion during the Spring recess.

You will note that the work at J.H.S. 158 Queens has been completed. The contractor on this project had been scheduled to work on the Bushwick High School project. We postponed work on the Bushwick Pool in order to complete the more urgent work at J.H.S. 158 during the Christmas recess. On this important removal project, we were fortunate to obtain the services of Murdoch and Sons, a contractor experienced in this area of work, to act as a consultant on the job site. They have provided training, advice and expertise which expedited the project and assured the safety of the personnel and environment.

We are now in the incipient stage of an extensive program to isolate all asbestos-containing acoustical plaster installations. The work will be performed by contractors through contracts prepared and bid in our division. In the first stage, fifty-eight (58) schools have been identified for inclusion in a request to the Office of Management and Budget for funding under Capital Budget line E-643. We anticipate early approval of our request. Meanwhile, our standard specification which will act as the guide for all the specifications for acoustical plaster work, is being finalized. Every effort will be made to maximize the work to be performed by contract during the Spring recess.

During our survey of the school buildings, approximately five hundred (500) samples of materials suspected of being asbestos-containing were taken. These are in various stages of being tabulated and sent to laboratories for analysis. When the laboratory results are known, we will be in a position to know with greater certainty the extent of our program.

In P.S. 198 Manhattan, the backs of book cabinets throughout the building had an asbestos material application. Teachers in the school were concerned about the method to be used by the contractor in performing the work of eliminating the asbestos. The situation was resolved by having the book cabinets removed from the building. They will be returned after the asbestos has been removed at the contractor's shop.

We had been concerned about the use of asbestos in swimming pools throughout the system. Especially since friable materials in three (3) pools (Andrew Jackson H.S. Q, Franklin K Lane H.S. K and Bushwick H.S. K) had forced the closing of those areas until removals are completed. There are forty-three (43) swimming pools in thirty-nine (39) school locations. With the exception of those pools where removal of asbestos is now taking place, only two (2) contain material which warrant testing for asbestos content. Samples have been taken for submission to laboratories. In some cases, pipe insulation that may contain asbestos, was used. However, there was no major use of

asbestos-containing materials for sound retardation purposes.

Within the next week, we expect to have the program developed for making repairs to damaged hung ceilings in schools where a sprayed-on fireproofing was used to protect structural steel members. We will supply materials to custodians and have them make these temporary repairs. This method of restoring the integrity of a hung ceiling to isolate asbestos materials is a means of providing protection to occupants until more positive containment or removal methods are developed. Temporary repairs have already been made at some schools, e.g., Susan Wagner High School and Benjamin Cardozo High School.

ARS:BJL:ym

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

January 16, 1979

MEMORANDUM

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #8

During the weekend of January 13, 14, 15, 1979, shop mechanics continued work in schools listed in my last memorandum (#7, dated December 29, 1978) as partially completed installations. These were schools that contained acoustic plaster ceilings where bonded-on acoustical tiles were being installed during Christmas week. Contractors neared completion on the asbestos-removal projects currently under contract. A full tabulation will be included in my next memorandum.

Since my last memorandum, I testified before the House of Representatives' Education and Labor Committee in Washington. As a copy of my testimony indicated, I also had a meeting with representatives from the National Institute of Health. The National Institute of Environmental Services and National Cancer Institute were represented. I explored the possibilities of Federal assistance for our program. I will be following up this potential source of Federal Grants for certain phases of our program.

P.S. 185/208 Manhattan

After informing the Bureau of Budget and Comptroller's office, I have issued an oral order for work to commence in P.S. 185/208. The contractor is H.E. Murdock and Sons, a Connecticut firm expert in the field of asbestos control. This project will be used as a demonstration project and will serve as a training ground for our design and maintenance staff, contractors who may be interested in bidding future asbestos related work, and individuals from interested jurisdictions in the New York area which may have similar asbestos problems. Our future contractors will be required to visit this site during the

progress of construction to witness proper procedures and precautions that will be required. It will be a prerequisite for qualifying on similar projects.

I expect work to commence in P.S. 185/208 on January 17, 1979.

CURRENT STATUS - SURVEYS

In my first memorandum (#1, dated November 6, 1978), I indicated a projected target date for surveying and inspecting all Board of Education facilities by late February 1979. Thus far, we have completed surveys in 587 buildings that were constructed or modernized during the years 1946 to 1971. We have listed another 921 sites to be surveyed. In this category are:

1. Buildings constructed before 1946 and after 1971.
2. Leased premises.
3. Buildings or premises used for administrative offices.
4. District 75 buildings or premises.

Completed surveys in this group number about 190.

Although we are on schedule for the February 1979 projection as far as owned premises are concerned, it now appears doubtful that all leased premises can be completed in this time period. The middle to end of March is a more realistic time frame for these sites.

CURRENT STATUS - Sample Testing

Thus far, 474 samples have been sent to the Walter C. McCrone, Associates Laboratories in Chicago for bulk sample analysis. Additional samples are being sent as they are received, but we don't anticipate too many more samples to be taken since surveys are now being conducted in older or newer buildings which have less liklihood for containing asbestos. Due to the current weather problems in the mid-west, we may experience delays in receiving reports back of the test results.

We hope within the next reporting period to develop a training manual that will be part of our management control system,outlining procedures in working on or around asbestos-containing materials. Also, we will be notifying Community School District Superintendents of our interim findings as a result of our surveys.

ARS:BJL:ym

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

February 2, 1979

M E M O R A N D U M

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum # 9

- -

Since my last memorandum, progress in the asbestos program is a follows:

P.S. 185/208 Manhattan

On Wednesday, January 17, 1979, H.E. Murdock and Sons started work. A media briefing session was conducted to introduce the project. Now into his second week on the job, the contractor after thoroughly sealing off the work areas with plastic barriers, has started his structural containment work in the third floor corridors. The electrical contractor is working along with him on related work in that trade. Controls were put into place with the cooperation of the school custodian.

With regard to the use of this job as a training ground and demonstration project, we mailed notices to contractors requiring their attendance at the briefing sessions. Notices were also sent to other city agencies and private sector educators inviting them to attend. Our personnel will also be attending the sessions as part of an in-house training program. Slides that were taken during the removal at J.H.S. 158 - Queens will be coupled with an audio sound track showing proper procedures and precautions to be utilized on an asbestos project. The Board photographer has been asked to take pictures at P.S. 185/208 as he did at J.H.S. 158 - Queens.

UPDATE STATUS - CURRENT REMOVAL PROJECTS

As I indicated in my memorandum number eight (8) (dated January 16, 1979), a tabulation of status of Phase I removed projects follows:

SCHOOL	PROBLEM	PROGRESS	COMPLETION DATE
Andrew Jackson H.S.-Queens	Friable Sound Deadening Material in Pool	Pool Closed Friable Material removed. Cont. cleaning area. Patching remains to be done.	Projected completion Feb. 2
Bushwick H.S.-K	Friable Sound Deadening Material in Pool	Pool Re-opened	Work Completed
James Madison H.S.-K	Sound Deadening Material Rooms 136, 138 Public Address Room		Work Completed
Susan Wagner H.S.-K	Spray-on Fire-proofing on Beams in Gym and Aud. Stage		Work Completed
P 219 - Queens	Spray-on Fire-proofing on Beams in Gym and Aud. Stage	Beams inaccessible. Teachers instructed to monitor activities. A.O. having trouble with contractor starting work.	Projected compl Easter Week.
Benjamin Cardozo H.S. - Queens	Spray-on Fire-proofing on Beams in Auditorium stage and Storeroom	Contractor working-asbestos removed. Contractor to submit shop drawings for re-fireproofing.	Projected compl February 28, 19
P 126 -K	Friable Sound Deadening Material in Cafeteria, Band and Music Rooms	Substantially complete - Painting trim.	99% Completed
Prospect Heights H.S.-K	Friable Sound Deadening material in Band Practice Room		Work Completed
Franklin K. Lane H.S.-K	Friable Sound Deadening material in Pool	Pool Re-opened	Work Completed

P 217 - L Annex	Spray-on Fireproofing on Beams		
P 158 - Q	Painted friable sound deadening material in student cafeteria	Cafeteria Re-opened	Work Completed

CURRENT STATUS - SURVEYS

We are continuing our survey of schools and leased spaces used by the Board. A summary of surveyed buildings and types of materials we have identified are as follows:

Number of Surveys..... 932
Number with Acoustic Plaster..... 361
Number with Spray-on Fireproofing.....74
Number with Soft Acoustical Material.....33
Number with Soft Acoustical Material
in student occupied spaces (includes
Phase I projects already completed)..... 9
TOTAL Number of schools with suspected Asbestos Materials..... 408

A complete listing of schools with materials identified in certain areas has been distributed to each Community School District Superintendent and the High School Superintendents. This listing has also been distributed to our various bureaus for dissemination to the work force as part of our management control system. It is intended to make those working on or around suspected asbestos materials aware of their presence.

Draft copies of our Abatement and Control Guidance Manual have been distributed for review and comment and before finalizing the document, I want Dr. Sawyer's comments and input.

Also as part of our management control system, we have designed a sticker that is to be applied to wall and ceiling surfaces wherever there are asbestos materials in a building. It will caution those who plan to perform any work in the area to check with the custodian who will have copies of the information sheets I mentioned before. An order for a supply of stickers is being processed.

Our Bureau of Building Services has been asked to report:

1) Those projects where roof repair specifications have been prepared or are planned and 2) Schools where reports of other water damage will require corrective work. From this information, we will be better able to establish priorities for a coordinated Asbestos/Roof Repair Program and monitor the progress of the work. Those projects that contain asbestos and require roof or water damage repair, will be higher on our priority lists.

CURRENT STATUS - ACOUSTIC PLASTER SPECIFICATIONS

As I indicated in a previous memorandum, we are planning on preparing specifications to contain acoustic plaster in over 50 schools during the fiscal year. Emphasis would be placed in bidding as many projects as possible for work to be performed during the Easter recess period. Specifications for twelve (12) schools have now been prepared and bid dates will be established in our attempt to work in these twelve (12) schools over the Easter recess period. Using more exact figures now that the specification work is complete, our previous estimate

CURRENT STATUS - ACOUSTIC PLASTER SPECIFICATIONS -(Continued)

based on averages of 10,000 square feet per school and $80,000 cost per building must now be adjusted upward. Twenty-one (21) schools where preparatory work is completed for specifications now average about $138,000 per job. The number of projects that we will bid over Easter week will be dependent on the results of the sampl analy

CURRENT STATUS - SAMPLES

We have not received written reports from our Chicago testing laboratory. Severe weather conditions there have forced a sporatic work schedule. They indicate of the 474 samples sent, they have analized about 224. Verbally, they report 114 samples show us asbestos content. We don't have written confirmation.

FOLLOW-UP - POOL STATUS

As I reported in memorandum number 7, two swimming pools contained a material used for sound attenuation that was to be tested for asbestos content. Verbal test reports of the material used in Curtis High School -Richmond, indicate no asbestos content. In Julia Richmond High School-Manhattan, a friable material used in a small area on the ceiling was verbally identified as containing asbestos. In Julia Richmond, shop mechanics will be installing temporary plastic drop cloths to isolate the asbestos materials. This will permit continued use of the pool until a determination can be made about a time schedule for removals.

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

March 5, 1979

M E M O R A N D U M

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #10

I can report the following progress on our Asbestos Program during the month of February.

P.S. 185/208 Manhattan (Demonstration Project)

While work progressed in the building, we conducted five successful briefing sessions. Attendance and participation in the lectures, slide presentations, question and answer period and building tours spanned a broad spectrum of interest groups. Our in-house people from various bureaus were in attendance (numbering approximately 150). In addition, about 60 people representing 42 contracting firms attended sessions as part of our information and pre-qualification requirements for bidding future asbestos related projects. Also attending have been representatives from:

Congressman Weiss' Office
Board of Higher Education
New York Fire Department
New York Regional Office of Environmental Protection Agency
Regional NIOSH (National Institute for Occupational Safety and Health) Offices - Cincinnati, Atlanta, Boston, New York
Diocesan Building Office
U.S. Environmental Protection Administration - OFfice of Toxicology
Various City Agencies

We expect to be conducting additional sessions until the contractor completes the project (projected completion is the end of March).

FUTURE DEMONSTRATION PROJECTS - I am preparing a letter to the National Cancer Institute, asking that funding be made available for several additional demonstration projects. The schools chosen for that purpose are as follows:

1. SHEEPSHEAD BAY HIGH SCHOOL - BROOKLYN - Exposed soft acoustic material in cafeteria and auditorium. Corrective work: Remove the material and replace with an alternative acoustic material.

2. SUSAN WAGNER HIGH SCHOOL - RICHMOND - Spray-on fireproofing throughout the building, with water damage. Corrective work: Repair water infiltration problems; Contain fireproofing materials in corridors and classroom areas; Encapsulate fireproofing materials in mechanical spaces and custodial areas.

3. P.S. 263 - BROOKLYN - Acoustic plaster in various areas in the building. Corrective work: Structurally contain acoustic plaster with approved methods.

4. P.S. 162 -BRONX - Spray-on fireproofing in various custodial areas inthe building. Corrective Work: Encapsulate fireproofing in mechanical and custodial areas.

In addition, we plan to monitor damage to an acoustic plaster installation that does not contain asbestos materials. Our purpose is to determine the extent of damage, where none now exists, as an aid in setting priorities for corrective work in future acoustic plaster materials that do contain asbestos.

LABORATORY REPORT ON SAMPLES

We have received the first written results from our Chicago testing laboratory. They have indicated the following:

Total number of samples sent to laboratory 474
Number of responses.....413
Number of materials containing asbestos.....201
Number of materials with no asbestos.....212

This does not mean we have 201 schools that contain asbestos. For example, in six (6) of the schools containing asbestos, more than one sample had been taken. A further breakdown of the tabulated figures is as follows:

Number of schools with confirmed, asbestos-containing acoustic plaster.....73
Number of schools confirmd, asbestos containing spray-on fireproofing.....43
Number of schools with confirmed, asbestos-containing soft acoustic or thermal material.....16

We have approximately 200 additional samples which are now being prepared for analysis. Additional samples will be taken as our surveys of the buildings continues.

We are now discussing with Dr. Robert Sawyer, methods of verifying the accuracy and reliability of the testing results in the schools.

Recently, the New York Regional Office of NIOSH requested that we work with a chemist in their Cincinnati laboratory, who is attempting to develop and perfect a testing method to identify asbestos using a chemical analysis process. IF the method is proved reliable, it could eliminate the need for costly microscopic and x-ray defraction methods for testing, which rely so heavily on the abilities of the person using the microscope. It would then become simple matter for on-the-site analysis using vials of chemical re-agent. We have agreed to send samples to the chemist and work with him in his efforts to perfect his approach which could have national impact, while giving us confirming information at no cost.

UP-DATED SURVEY INFORMATION

To date, we have surveyed 1,200 school buildings or sites used by the Board for educational or administrative purposes. About 1,412 such sites exist, leaving about 212 sites remaining to be surveyed. Our projected date for completing all surveys in March still holds. In these latter stages of the survey portion of the program, we are finding considerably less material that appears to contain asbestos in student occupied spaces. Since our last report, we surveyed 268 schools of which 41 (approximately 15%) were visually identified as having a material that might contain asbestos. Samples were taken in each instance to determine the presence of asbestos in the materials.

ASBESTOS ABATEMENT PROJECTS

The ceiling of the pool in Julia Richman H.S., was found to contain soft acoustic asbestos-containing material. Our shop mechanics undertook and completed the project of containing the material, making the pool area safe for use. At P.S. 71 Manhattan, one corridor was completed by our shops using our newest acoustic plaster containment method. Five eighths (5/8) inch thick sheetrock was toggle-bolted to the ceiling. Acoustic tiles were then bonded to the sheetrock. Costs will be ascertained for this procedure from material and labor records maintained for this project.

Dr. Sawyer inspected a number of schools which have been confirmed to contain asbestos. He is making recommendations to us as to methods to be used inthe abatement projects.

PUBLIC TESTIMONY

On February 5, 1979, I testified before the Education Committee of the New York City Council indicating progress in our asbestos control program and outlining priorities, projected costs and the need for financial assistance.

On February 21, I testified for a second time before the House of Representatives Education and Labor Committee - Sub-Committee on Education in Washington. This was a follow-up and update of information relative to two bills, sponsored by Congressman Perkins and Congressman Miller. I offered comments regarding both bills on ways that they could be improved, with special emphasis on the need for retroactivity to be included in order that we can recoup monies already expended. I believe that the committee was receptive to the proposed changes.

OUR ASBESTOS UNIT AS A RESOURCE

City, State and Federal Government Agencies as well as other jurisdictions have taken advantage of the expertise we have gained in this field.

The Department of Sanitation is investigating asbestos problems in its offices and garages. The Housing Authority is beginning the asbestos survey and analysis of its installations. Both agencies have met with us to seek guidance in their programs. Assemblyman Stavisky's and Senator Goodman's offices have requested data and guidance with a view toward preparing State legislation. Congressman Weiss' office has also requested information. The United States Office of Toxic Services and the National Institute of Occupational Safety and Health have sent representatives to the demonstration project and to our office to learn of our procedures. We have received requests for information from local private and church organizations as well as requests from offices as distant as the state of Nebraska. We believe that our program is receiving nationwide recognition.

ARS:BJL:ym

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

April 18, 1979

M E M O R A N D U M

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #11

Following is a summary of major events since the previous memorandum:

1. Federal funds for Demonstration Projects. Although we are awaiting final confirmation, which should be forthcoming in a week, it appears likely that the National Cancer Institute will transfer funds to the Occupational and Safety Health Agency, a part of the Department of Labor, for three major demonstration projects to be conducted in three of our schools this summer. In addition, we will be able to apply for funds to make a training film at these three sites, which will be used nationwide by several of the National Institutes of Health as well as other federal agencies. The focus of the film and the training projects will be worker protection.

2. Surveys and Laboratory Results. We have now surveyed 1,400 Board of Education locations; we have taken a total of 725 samples and had 528 of those completely analyzed. The results are as follows:

Number of samples taken	725
Number of samples analyzed	528
Number of schools with asbestos used in plaster, soft acoustic material, or fireproofing	147
Samples awaiting results	50

3. Summer Program. We hope to work in about 50 schools this summer. We do not know what bids we will get from contractors so it is uncertain at this time how many of the schools we will in fact be able to work in.

4. Easter Work Program. We are working in three schools during the recess. We had planned to work in twelve, however laboratory results from nine of the schools for which specifications had originally been written were found not to have asbestos. No other specs were available in time to bid for this recess.

5. Work Priority. Working closely with Dr. Robert Sawyer of Yale, we have developed a hazard and work priority formula. Using this formula we are able to establish the urgency of the abatement program on a room by room basis in any given school. The formula has now become part of the Federal Environmental Protection Agencies asbestos abatement doctrine and will be included in a national publication. It takes into account a wide variety of variables and permits a certain amount of subjective difference on the part of those surveying. We think it is a major contribution for school administrators around the country.

6. Environmental Protection Agency Seminar. Division of School Buildings personnel from the Asbestos Task Force were invited by Federal EPA to participate in briefings on March 27 and 28 for EPA personnel from throughout the entire northeast region of the United States. We presented the slide tape show that has been used for training at P.S. 185/208 and took the entire group, after school was closed, to P.S. 71 in Manhattan as a reinforcing field trip. The Division of School Buildings has, in effect, become the major federal training ground for EPA, NCI, NIOSH, NIEHS, and apparently HEW. It is quite a tribute. They are coming here not simply to see schools that have an asbestos problem; they are coming here to see what a progressive and aggressive administration is doing to deal with the problem.

7. P.S. 185/208. The final training and demonstration session took place at P.S. 185/208 on March 29. Following is a partial summary of those who attended:

   1. Division of School Buildings personnel.....434
   2. Personnel from local contractors.....112
      a. Above figure represents 78 different firms and 1 Minority Trade Association
   3. City, State and Federal Agencies..... 14
   4. Private schools and companies..... 5
   5. Press coverage of the seminar itself from media organizations..... 4
   6. Other individuals or groups..... 4

A total of 633 individuals signed the log, although it was far for complete and we estimate somewhere in the neighborhood of 725 attended the seminar.

Work at the school should be completed towards the end of April, although we have run into delays caused by additional work which has been assigned to the contractor. The community school board and the parents understand this, and in fact some of that work was at their request. So far, the work which has been done appears to be excellent.

8. Press Coverage. The work of the Board of Ed was the focal point of a lengthy feature on CBS National News which ran on Friday morning, March 16. New York Times had a major story on Saturday, March 31, which despite some inaccuracies, was a useful and constructive article. The MacNeil-Lehrer Report of Monday, April 16 was devoted to the problem of asbestos in schools. It started with a three and half to four minutes segment filmed at P.S. 185/208 which included an interview with me and a description of the work being undertaken there as representative of what we are doing elsewhere. Look Magazine will be publishing an article on asbestos in schools towards the end of this month or early May. Family CIRCLE will have an article on asbestos in schools sometime in September, written by New York Daily News correspondent, Mark Liff. Because of his New York base, it will focus considerable attention on the work that we have done here in connection with Bob Sawyer of Yale.

9. Assistance to other city agencies. At the request of Sanitation Commissioner Norman Steisel, our three most experienced asbestos task force inspectors visited a sanitation garage at Bergen Landing in Queens, near JFK airport. I have forwarded the detailed report and recommendations which they prepared, but in summary the location was found to have very serious problems and, acting on our recommendation, the Commissioner has closed that portion of the garage which has exposed an extremely severely damaged asbestos fire retardant. An abatement project is planned in the immediate future by Sanitation. We have provided some assistance to other agencies such as the Buildings Department and the Department of Environmental Protection.

ARS:ss

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

June 12, 1979

MEMORANDUM

TO: Frank J. Macchiarola

VIA: Richard Halverson

FROM: Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #12

The following is a summary of the asbestos program to date:

1. P.S. 185/208 reopened on Monday, June 11, 1979. The total cost has not yet been calculated but will be in the vicinity of $275,000. This is more than twice the original estimate because significantly more than twice the original amount of work ended up being done in those schools. The schools are virtually new in appearance with entirely new ceilings in all corridors and fourteen (14) classrooms. In every location within the building where we worked all previously painted surfaces have been repainted, thus all the corridors appear practically new, as well as many of the classrooms and other locations within the building. Three (3) different techniques were used in the building: (a) the installation of strong barrier ceilings - used throughout much of the building; (b) removal - used in two relatively small, limited areas where containment was not practical; and (c) encapsulation with Decadex Firecheck, used in the kitchen and a custodial fan room as well as a few small areas to which no students or teachers will have regular access.

2. The summer 1979 program is as follows:

   Work will be carried out in at least 45 schools. We had originally planned to do 50 and had written specifications for that number, however, a number of schools have been cancelled following laboratory samples which indicate no asbestos present. (Comment: from

this experience we have learned that it is necessary, in many cases, to have several samples from within any given school before making the operational decision to proceed with an abatement project. As a result of the approach, for example, we will not have to expend an anticipated $567,900 in Wingate High School to do work throughout the entire building but rather a relatively small amount under $100,000 for limited work in a limited number of locations within that school).

We anticipate that the work in the 45 schools will cost in the neighborhood of $2.5 to $3 million for the summer.

We anticipate that all asbestos containment work in those schools will be completed before school reopens. There may be some limited cosmetic and/or acoustical work (the gluing of acoustical tiles on to plaster board) which will continue into the school year. That work poses absolutely no risk or hazard to anyone in the building.

3. We now realize that modernization in buildings which contain acoustical plaster present a potential problem which had not previously been recognized. As we use the term "modernization" usually refers to rewiring a building and replacing incandescent with flourescent light fixtures. Of necessity and by definition this requires extensive work in ceilings. If those ceilings contain asbestos, we will be releasing fibers when we work in and around them. Previously we have not had this problem because buildings that we were modernizing were generally built prior to the use of asbestos in this manner. We are now beginning to modernize buildings constructed in the early 1950s and will encounter asbestos acoustical plaster for the first time. We will be confronted with one of two options: (1) close the school while the modernization goes on; in the past we have carried out modernizations while the building continued to be occupied as an educational institution; or (2) if the architecture of the building permits it, isolate and empty one wing at a time for modernization. A modernization must be carried out both horizontally and vertically so it will not work to simply isolate a floor, we will have to isolate an entire vertical wing as well. If we cannot successfully isolate, we will then have to relocate students. It <u>may</u> be possible to relocate students in a building that we had otherwise planned to close and keep it opened for a few months while modernization is carried out in the target building. This may be cost effective in that the contractor will be able to work much faster in an empty building and that savings may more than offset the cost of keeping a building for an additional year. At the moment, this is merely hypothetical and we do <u>not</u> have any examples in mind.

4. Negotiations with the Occupational Safety and Health Administration (OSHA) of the Department of Labor continues and it appears that a contract will be in place in the near future which will provide us with funds to offset some of the costs of removal and containment operation in several schools during the summer. Those schools are likely to include: Sheepshead Bay High School in Brooklyn, Cardoza High School in Queens, and several other locations. OSHA will be funding the making of a film, 30 minutes, in sound and in color, to focus on worker protection and safety associated with asbestos abatement projects. This film should result, in among other things, a training program for us to use for our own personnel as well as those of contractors and also should provide national recognition for the leadership role which the Board of Education has taken in this field.

ARS:ss

received
7/17/79

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

July 12, 1979

M E M O R A N D U M

TO: Frank J. Macchiarola

FROM: Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum #13

I. 1979 Summer Asbestos Abatement Program

With the July 3rd meeting of the Board of Education, the final asbestos abatement contracts for work this summer were awarded. The total for this summer's work follows:

Total number of schools in which work is taking place: 45

Total cost of all contracts is $2.9 million.

Thirteen construction contractors and seven electrical contractors are performing the work at the above schools.

II. OSHA Film and Demonstration Project

The filming has begun at both Sheepshead Bay High School and Cardoza High School.

III. New York City Program

We have provided the city with our internally written and published asbestos manual which has now been widely circulated throughout the Division of School Buildings. The city has made a few changes in it and has begun printing it for its own use. We have been asked to participate in the development of a city asbestos abatement program and Roger Chiljean and I recently met with a group chaired by Deputy Mayor Ronay Menschel.

IV. Statewide Program

On Monday, July 16th I will be meeting with the New York State Department of Health at the World Trade Center to discuss its response and reaction to the asbestos legislation recently passed by the New York State Legislature. That legislation, introduced by Stavisky, does nothing for New York City in that it directs, with no funds provided, local school districts to survey and sample in their schools for asbestos and then to develop an asbestos program. Since only New York has done this, New York State is interested in our guidance as they develop their program.

V. Federal Legislation

The Miller Bill, which would provide long-term no interest loans for asbestos abatement projects is still awaiting a rule in the House. Similar legislation was introduced in a Senate Committee early in July. The future of this legislation remains uncertain.

ARS:ss
cc:Reuven Savitz

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

August 17, 1979

TO: FRANK J. MACCHIAROLA

FROM: ANTHONY R. SMITH

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM # 14

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1. 1979 SUMMER ASBESTOS ABATEMENT PROGRAM

Mid-way through the summer in the 45 contracts under way, the overall progress of contracts is encouraging. As of August 10th, the last reporting period from each of our Area Offices, we average, on a city wide basis, about 46% completion on all projects.

11. FEDERALLY FUNDED DEMONSTRATION PROJECTS FILM

Filming has continued at Sheepshead Bay High School and Cardozo High School. Most of the actual construction sequences have been completed. Some background scenes of New York and a few contractor motivational aspects must be filmed. We have not viewed any of the footage, but reports from Battelle Labs indicate they are very satisfied with what they have developed thus far.

We have met with OSHA representatives on August 15th, to discuss our program and progress on the demonstration projects.

111. CITY, STATE AND FEDERAL PROGRAMS

We have provided assistance to City Hall in their attempts to organize an asbestos program. This has taken the form of advice and counsel. The Department of Parks has recently sought our advice in evaluating conditions at one of their sites.

Now that the Governor has signed the Stavisky Bill, which contains reporting deadlines to identify asbestos hazards in schools, there will probably be a statewide thrust in this area. The legislation was approved with deadlines for inspection and filing with a Commissioner, information on asbestos materials and their locations, by November 1979. By April 1980, local school authorities must submit a plan for abatement. We expect our assistance will be sought due to our experience in these areas.

At the Federal level, there has not been much activity on proposed legislation.

ARS:RAC:db

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

September 18, 1979

TO: DR. FRANK J. MACCHIAROLA, CHANCELLOR

FROM: MR. ANTHONY R. SMITH

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM #15

This memorandum will be rather lengthy. It is a summary of asbestos abatement work completed to date, an update of the federally funded demonstration projects and a projection of what we hope to accomplish in the near future.

I have attached detailed progress sheets for abatement work already completed. Part I itemizes work prior to the summer and Part II indicates the comprehensive nature of the summer abatement program. Let me briefly summarize here.

Number of Projects completed prior to Summer 1979	19
Number of Projects completed during the Summer 1979	53
TOTAL.....	72

Cost of abatement work done by contract..... $3,451,124

Summer 1979 projects are listed as complete. They are all 100% contained (except for I-201-Manhattan - Auditorium). That means the asbestos materials have been protected with paint or a structural barrier. Eleven (11) jobs are 100% complete, (sixteen (16) more are 99% complete). In 42 cases, projects will require some electrical work and other minor work (such as painting, trim, sticker applications) before they can be listed as 100% complete. We expect the remaining work on these projects will be completed in September or early October.

Federally Funded Demonstration Projects

Cardozo High School - Queens - Contractors virtually completed work on August 30. One storeroom, previously locked and inaccessible remains to be completed. It is not being used presently and the contractor will be completing this small area during the next long weekend.

(Continued)

Federally Funded Demonstration Projects - (Continued)

Sheepshead Bay High School - Brooklyn - The General Contractor completed his removal, replacement and encapsulation and clean-up prior to school opening. The Electrical contractor is completing fixture re-installation in the cafeteria now, working around the scheduled lunch periods.

Project Filming - As work on each project progressed, Battelle Columbus Laboratories filmed all pertinent work operations. Final New York skyline sequences were completed August 18/19. I will be at the Columbus Laboratories on September 19th and 20th for a script and film editing conference. Within two weeks, I hope to have a committment for a well known narrator.

Except for progress follow-ups and coordination, our involvement in the overall project is winding down as the Battelle effort to produce the film, slide cassettes and printed matter will intensify.

Overall Program

Our efforts at taking additional samples in all buildings will be finished shortly. We will end up with about 1900 samples. Two laboratories will be providing confirmation on the asbestos content and we will have a firm basis for future work projects.

There are now 171 schools that have some form of asbestos containing materials (except pipe and boiler insulation). This number changes from time to time as we receive test results, but I don't expect it will exceed 200. Of the 171 schools, 146 have the materials in student occupied areas.

Our next group of schools we will concentrate on contain sprayed-on materials. Where these materials was used in student occupied areas, they were generally protected with a hung ceiling assembly. Custodians have been alerted to immediately repair damaged hung ceilings or report them to the area offices for immediate repair. When the materials are exposed, they are generally Boiler Rooms and Custodial spaces. The soonest work in these areas can start will be the Easter recess because of heating requirements in the winter. About 13 encapsulation projects are scheduled for the Easter recess period.

During the upcoming recesses, I hope to schedule relatively small, but needed abatement work that shop mechanics can perform. Our target will be about 12-15 acoustic plaster abatement projects over any long weekends or Christmas. Next summer, I expect to complete at least as many projects as we did this summer. Availability of contractors will probably be our only limiting factor.

ARS:RAC:db
cc: Reuven Savitz
Joseph Saccente
Richard F. Halverson
Nat Quinones
Louise Latty

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

February 6, 1980

MEMORANDUM

TO: Dr. Frank J. Macchiarola, Chancellor

FROM: Mr. Anthony R. Smith

SUBJECT: Asbestos in School Buildings
Memorandum # 16

Although I have not prepared an informational memorandum on our asbestos program recently, and there has been much progress, I will attempt to be brief.

OVERALL PROGRAM

Except for isolated instances, we have completed our sampling efforts. Our two primary laboratories have given us some conflicting information on the presence or absence of asbestos, delaying our final decision on corrective work in some schools. While attempting to resolve those conflicts, we have taken bids on 13 encapsulation projects in Boiler Rooms, for work during the Easter recess period. Those 13 jobs, along with a list of about 60 other projects scheduled for preparation of specifications for Summer 1980 work, are confirmed asbestos-containing schools.

We now have about 187 schools that contain asbestos. About 164 of the 187 schools have asbestos materials in student-occupied areas. These numbers could conceivably increase by 40 if all the conflicting results show the presence of asbestos and all are in student spaces.

Over the Christmas recess period, shop mechanics completed five (5) small acoustic plaster containment projects.

FEDERALLY FUNDED DEMONSTRATION PROJECTS

The film and slide cassettes are nearing completion. I have attended several screenings, the latest on January 21. The Gabe Kaplan sequence was spliced in for that session. On February 13, another session is scheduled with the Battelle people. Generally, I am satisfied with the progress and content of the entire audio visual package. Permission to use "Stayin' Alive" for the theme music, coupled with a film title of "Doin' it Right", should contribute to a successful "up-beat" package.

Application has been made for another federal grant to perform encapsulation work in several Boiler Rooms, then evaluate the relative effectiveness of various products, methods and a variety of work on the different asbestos-containing products. Air monitoring before, during and after will provide information on potential hazard levels in this heretofore unemphasized school building area. Review of our application will probably take place in April and if we are successful in obtaining our $545,000 request, work will start in the selected schools in June, 1980.

CITY, STATE AND FEDERAL INVOLVEMENT

We have continued to receive inquiries, and assist anyone with an asbestos problem. Several of those inquiries have come from other city agencies.

On January 9, 10, 11, Mt. Sinai sponsored an Asbestos Control seminar that I participated in as a speaker and panel moderator. City agencies sent representatives, along with federal and private sector people, and I am sure they came away with valuable information.

Both in December and January, representatives of U.S. EPA spent several days with us. They are interested in preparing a case study on our program that should benefit many others who have an asbestos problem. We are furnishing data and talking with two EPA contractors whose tasks are aimed at a broad dissemination of our experiences.

On a statewide level, I have participated in an asbestos Advisory Council meeting at the State Education Department in Albany. Again, we are providing advice and data so that a responsible State program can be implemented. Even though the State School Asbestos Safety Act was enacted in July, 1979, the State has not instituted an effective program.

Also, I have testified at the Stavisky hearings in Albany on February 5, and expect to do the same when Senator Javits holds hearings on the Senate Asbestos bill in a few weeks.

You are probably aware of the overwhelming passage of HR 3282 in December, 1979.

ARS:RC:jsf

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

May 7, 1980

M E M O R A N D U M

TO: DR. FRANK J. MACCHIAROLA, CHANCELLOR

FROM: MR. ANTHONY R. SMITH

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM NO. 17

The following information will update our asbestos program progress:

OVERALL PROGRAM

We were only able to complete two of the asbestos encapsulation projects during the Easter recess period. The remaining projects will be done this summer. The contractors did not have registered contracts in time, and those that had awards, were not willing to work (except for the two) on the strength of Proceed Letters.

With these displaced Easter projects and the specifications that are now ready for bidding (or have been bid already) our summer work program will probably involve between 50 and 60 schools.

The total number of confirmed asbestos containing schools has grown to 232. In many schools only one sample was analyzed early in the program. We now have several samples from those schools, in the hands of two or more laboratories, and are in some cases, getting conflicting results. It is in the resolution of the conflicts, that we are increasing the number of schools that contain asbestos.

The combination of an increasing number of schools requiring work, and our inabilities to have contractors on board to perform work during recess periods, may extend our program beyond the summer 1981 recess period. We have completed asbestos work projects in 85 schools.

(Continued)

FEDERALLY FUNDED DEMONSTRATION PROJECTS

The training film and slide cassettes will be formally presented at a screening I willl attend in Washington, the week of May 12, 1980. We are all pleased with the outcome and now look forward to general release.

We have not heard about our more recent grant application to NIOSH for $545,000, but have been advised that seven successful applicants will be notified very soon. We could not determine whether we were one of the seven. When we are notified officially, we are prepared to start immediately with the work we outlined in our application. As you recall, this application addressed asbestos material conditions in Boiler Rooms and their possible affect on Custodial Employees and other school occupants. Additionally, corrective work was to be performed and material conditions evaluated.

GENERAL INFORMATION

We continue to be an asbestos information resource both locally, as well as responding to inquiries from New York State, California (U.S. Navy), Louisiana (New Orleans Mayor's Office) and Canada (Toronto, city and Provincial officials and private people).

More directly, we have offered direct assistance to Brooklyn College, Presbyterian Medical Center (New York Psychiatric Center) as well as our continued involvement on the New York State Asbestos Advisory Council.

Results of our joint efforts at P.S. 185/208 before Senator Javits, have paid off. An Asbestos Bill was approved by the Senate Sub-Committee shortly after we testified, and the Senate Labor and Human Resources Committee approved the bill on April 30th.

We are also continuing our contractor training efforts, now expanding exposure to the actual workers. Identification cards are being issued to attendees, and no worker will be permitted to work on an asbestos related project unless he has attended a training session. The issued card must be displayed while the worker is on the work project. Use of motivational Training Package will facilitate this endeavor.

ARS:RAC:db

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ANTHONY R. SMITH
EXECUTIVE DIRECTOR

September 23, 1980

TO: DR. FRANK J. MACCHIAROLA, CHANCELLOR

FROM: ANTHONY R. SMITH

SUBJECT: ASBESTOS IN SCHOOL BUILDINGS
MEMORANDUM NO. 18

I will briefly outline progress in our Asbestos Program. Our greatest activities in the past three months were concentrated on work projects that took place this summer.

SUMMER PROGRAM

Work took place in 57 schools. Again, the major asbestos material worked on, was acoustic plaster, both structurally contained or sealed with paint. But encapsulation and some removal also took place. Cost of this work approached one million dollars. With a few exceptions, work was completed prior to the opening of each school. In the majority of work in major student occupied areas was complete, or contained and safe for occupancy. In the others, work was pretty much confined to Auditoriums which could be effectively isolated from other parts of the building.

Our new contractor training efforts continued. We issued worker identification cards. Workers were required to display the cards while working on any project. Training continued from the spring and tapered off during the summer, but over 60 contractors sent over 350 workers to the sessions. We used an early release of the Asbestos Training Film as the basic media device.

FEDERAL PROGRAM

We did not get the NIOSH grant, and were disappointed.

I am trying to iron-out some nagging details with OSHA on the Asbestos Training Film. The release is being delayed longer than we anticipated. I think we have resolved some of these details this past week.

ARS:RAC:db

Appendix C

Summary Form, Building-Specific File

ASBESTOS PROGRAM

17	46 McKeever Place 11225	1·320	K
DISTRICT	LOCATION	SCHOOL	BOROUGH

A Acoustic Plaster

Corridor (Basement), Music Room, Band Practice Room.

#	TEST SAMPLE LOCATION	Results
16	Corridor (Bsmt.)	No
658	Music Rm. C-2	No
659	Corr.(Bsmt. at Music Room)	Yes
661	Music Rm. C-2	Yes
1732	Corridor (2nd fl.	No
1733	Corridor (Bsmt.)	Yes
1734	Room 210	No

B Spray on Fireproofing Soft Acoustic Material

S.O.F. throughout building

121	Corridor (3rd fl.)	Yes
657	Corridor (4th fl.)	Yes
660	Corridor (3rd fl.)	Yes

C Insulation (piping / boilers)

Specifications (work description)

Area Shops: Repair damaged hung ceilings in areas below spray-on fireproofing. Spec.# 918-E-81 - Contained Basement Corridor and Music Room. Removed and replaced hung ceilings in 3rd & 4th floor corridors.

Above work completed.

Remarks:

REVISED: 1/12/82
REVISED: 9/15/80
Date 9/5/79

Appendix D

Initial Asbestos Survey Instructions and Data Forms

INSTRUCTIONS

FOR

COMPLETING ASBESTOS SURVEY

FORM "B"

A. Please fill in School number for P.S. or I.S. and name for High School. (All sheets)

B. Check off box pertaining to Borough. (All sheets)

C. Write in District Number. (All sheets)

D. Fill in name and telephone numbers (School and home) of both Custodian and Principal. (Sheet 1 only)

E. Number sheet 1 of 3; 2 of 3; etc.

MATERIAL TYPE	DESCRIPTION AND POSSIBLE LOCATION
1. Acoustic Plaster	Rather dense, with some resiliency. Usually found in corridors, auditoriums, cafeterias, music and band practice rooms, libraries, some offices and sound control rooms.
2. Acoustic Tile Lay-In	A mineral tile board usually 24"x48" in size. Can be found almost anywhere, most commonly in corridors, lunch rooms and other large areas.
3. Spray On Fireproofing	A soft, knobby looking material sprayed to steel. In most cases above a hung ceiling, although it may be exposed in auditorium stage areas and custodial spaces.
4. Soft Acoustic Material	A soft fluffy type applied to walls and ceilings of music and band practice rooms and swimming pools.
5. Acoustic Tile Spline no backing	A mineral tile 12"x12" with no back up. Suspended by metal carriers with flat thin metal strips used to engage grooves on edges of tile. Usually found in corridors, lunchrooms and other large areas.
6. Acoustic Plaster	Same as Type 1, but used on walls.
7. Soft Acoustic Material	Same as Type 4, but used on walls.

Please inspect each space in building and check off appropriate spaces. If none, write none.
Use type numbers 1 thru 7 as described above to indicate extent and type of damage.
List only classrooms with types of materials listed in 1 thru 7.
Please indicate on last sheet if you observe any damaged pipe covering and it's location; an asbestos curtain on auditorium stage (H.S.) and any other remarks you may wish to enter.
If fireproofing is visible directly above damaged ceiling, indicate approximate square footage of missing ceiling tiles directly beneath fireproofing in remarks column.

THANK YOU FOR YOUR COOPERATION

ASBESTOS SURVEY

DATE | TELEPHONE

B SCHOOL
NUMBER OR NAME: .....
ADDRESS: .....

BOROUGH ☐ BRONX ☐ BROOKLYN ☐ MANHATTAN ☐ QUEENS ☐ STATEN ISLAND

DISTRICT

CUSTODIAN ..... SCHOOL .....
HOME .....
PRINCIPAL ..... SCHOOL .....
HOME .....

VISUAL INSPECTION OF FIREPROOFING AND OR ACOUSTICAL TREATMENT | PLEASE FILL IN APPROPRIATE SPACES WITH CHECK ✓

LOCATION	ORIGINAL CEILING FINISH & TYPE						ORIGINAL WALL FINISH		*EXTENT OF DAMAGE				*CAUSE OF DAMAGE			
									* INDICATE BY # RELATING TO TYPE OF FINISH							
	1 ACOUSTIC PLASTER	2 ACOUS. TILE LAY-IN	3 SPRAY-ON FIREPROOFING	4 SOFT ACOUSTIC MATERIAL	5 ACOUSTIC TILE SPLINE NO BACKING	REMARKS	6 ACOUSTIC PLASTER	7 SOFT ACOUSTIC MATERIAL	NONE	LESS THAN 10%	10% TO 50%	OVER 50%	VANDALISM	WATER	CONST. OR MAINT.	SELF FLAKING
Corridors–																
– " 1st floor																
" 2nd "																
" 3rd "																
" 4th "																
Vestibules–Lobbies Exit #																
Auditorium																
Projection Room																
Music Room																
Band Practice Room																
Library																
Student Cafeteria																
Teachers Cafeteria																
Kitchen																
Other Rooms																
Gymnasia																
Offices by rm.#																
Swimming Pool																
Custodial Spaces Boiler Room																
Fan Room																

Note: Attach additional sheets as required SHEET ___ of ___ Signature_____ Date_____

ASBESTOS SURVEY

B

SCHOOL
NUMBER OR NAME: _____
ADDRESS: _____

BOROUGH
☐ BRONX ☐ BROOKLYN ☐ MANHATTAN ☐ QUEENS ☐ STATEN ISLAND

DISTRICT

DATE

TELEPHONE

CUSTODIAN _____ SCHOOL _____ HOME _____
PRINCIPAL _____ SCHOOL _____ HOME _____

VISUAL INSPECTION OF FIREPROOFING AND OR ACOUSTICAL TREATMENT

PLEASE FILL IN APPROPRIATE SPACES WITH CHECK ✓

LOCATION	ORIGINAL CEILING FINISH & TYPE						ORIGINAL WALL FINISH		*EXTENT OF DAMAGE * INDICATE BY # RELATING TO TYPE OF FINISH				*CAUSE OF DAMAGE			
	1	2	3	4	5		6	7								
Classrooms or other Rooms of Instruction	ACOUSTIC PLASTER	ACOUS. TILE LAY-IN	SPRAY-ON FIREPROOFING	SOFT ACOUSTIC MATERIAL	ACOUSTIC TILE SPLINE NO BACKING	REMARKS	ACOUSTIC PLASTER	SOFT ACOUSTIC MATERIAL	NONE	LESS THAN 10%	10% TO 50%	OVER 50%	VANDALISM	WATER	CONST. OR MAINT.	SELF FLAKING

Note: Attach additional sheets as required

SHEET ___ of ___

Signature _____ Date ___

Appendix E

Abatement Contractor Evaluation Forms

ASBESTOS FIELD REPORT - N.Y.C. BOARD OF EDUCATION - DIVISION OF SCHOOL BUILDINGS - ASBESTOS TASK FORCE

SCHOOL _____ DISTRICT _____ CONTRACTOR _____

REPORT BY _____ DATE _____ TIME IN _____ TIME OUT _____

WORK IN PROGRESS (CHECK APPROPRIATE BOX - COMPLETE ALL BOXES)

YES	NO		YES	NO	
☐	☐	Plastic barriers/temp. facilities	☐	☐	Removal
☐	☐	Air-Testing	☐	☐	Encapsulation
		Locations _____	☐	☐	Containment/Gypsum Panels
		TOTAL NUMBER OF WORKMEN PRESENT _____	☐	☐	Acoustic Tiles
		REMARKS _____	☐	☐	Sealing (Acoustic Plaster)
		_____	☐	☐	Pipe/boiler insulation

OBSERVATIONS

YES	NO		YES	NO	
☐	☐	Plastic Barriers in Place.	☐	☐	Clean Room.
☐	☐	Plastic Barriers Maintained.	☐	☐	Clean Room Located Properly.
☐	☐	Duct Tape Used.	☐	☐	Shower.
☐	☐	Workers Using Proper Masks.	☐	☐	Shower Located Properly.
☐	☐	Workers Using Disposable Uniforms.	☐	☐	Daily Clean-Up Satisfactory.
☐	☐	Workers Changed Uniforms As Required.	☐	☐	Dust and Dirt Confined to Work Area.
☐	☐	Workers Changed Filters As Required.	☐	☐	Debris Bagged Properly.
☐	☐	Had Uniforms for Inspectors.	☐	☐	Final Clean-Up Thorough.
☐	☐	Had Masks for Inspectors.	☐	☐	Final Clean-Up Satisfactory.
☐	☐	Caution Signs-Adequate/Displayed.	☐	☐	Additional Clean-Up Required.

CITATIONS ISSUED FOR ITEMS CHECKED AS " NO " ABOVE YES ☐ NO ☐

ITEMS CITED FOR NON-COMPLIANCE _____

REMARKS: _____

_____

NOTE: USE ONLY THE FOLLOWING SYMBOLS:

5 - EXCELLENT
4 - GOOD
3 - AVERAGE
2 - BELOW AVERAGE
0 - POOR

CONTRACTOR

PLASTIC BARRIER SHEETING PROPERLY INSTALLED	
IMPROVED AFTER CITATION	
VENTS AND REGISTERS SEALED	
IMPROVED AFTER CITATION	
DUCT TAPE USED	
IMPROVED AFTER CITATION	
BARRIERS MAINTAINED	
IMPROVED AFTER CITATION	
BARRIERS IN PLACE UNTIL FINAL CLEAN-UP	
IMPROVED AFTER CITATION	
WORKERS USED SUITS IN WORK AREA	
IMPROVED AFTER CITATION	
WORKERS CHANGED SUITS AS REQUIRED	
IMPROVED AFTER CITATION	
WORKERS USED ROPER MASKS IN WORK AREAS	
IMPROVED AFTER CITATION	
WORKERS CHANGED MASKS/ FILTERS AS REQUIRED	
IMPROVED AFTER CITATION	
HAD SUITS FOR INSPECTORS	
IMPROVED AFTER CITATION	
HAD MASKS FOR INSPECTORS	
IMPROVED AFTER CITATION	
FOLLOWED SUGGESTIONS FOR PERIODIC CLEAN-UP	
IMPROVED AFTER RECOMMENDATION	
DUST AND DIRT ONLY WITHIN WORK AREA	
IMPROVED AFTER CITATION	
CAUTION SIGNS ADEQUATE	
IMPROVED AFTER CITATION	
CAUTION SIGNS DISPLAYED PROPERLY	
IMPROVED AFTER CITATION	
'PRIME' PROVIDED ADEQUATE SUPERVISION OF 'SUBS'	
IMPROVED AFTER CITATION	
'SUBS' PERFORMED PER SPEC. REQUIREMENTS	
IMPROVED AFTER CITATION	
FINAL CLEAN-UP WAS THOROUGH	
IMPROVED AFTER CITATION	
FINAL CLEAN-UP WAS SATISFACTORY	
CLEAN ROOM	
AIR TEST PERFORMED	
SHOWER	
OVERALL RATING	

Appendix F

Components of a Post-Survey Monitoring System

ASBESTOS

MATERIALS IN THIS SCHOOL
CHECK WITH CUSTODIAN PRIOR
TO PERFORMING ANY WORK.

ASBESTOS

MATERIALS IN THIS SCHOOL
CHECK WITH CUSTODIAN PRIOR
TO PERFORMING ANY WORK.

INSTRUCTIONS FOR COMPLETING
CUSTODIAL ASBESTOS PROGRAM REPORT

A. Custodians who have spray-on fireproofing, soft acoustic/thermal material or acoustic plaster (as reported on Information Sheets) will complete:

1. School, Borough, District.

2. Location (list each space within the building where various materials are present).

   a. If spray-on fireproofing was used throughout building - so note - list exceptions, plus any individual areas where water damage or damaged hung ceilings are present.

3. Work by:

   a. Custodian - locations where he has repaired damaged hung ceilings under spray-on fireproofing.

   b. Shops - locations where shop mechanics have repaired damaged hung ceilings under spray-on fireproofing or have done some corrective work on acoustic plaster.

   c. Contractor - locations where contractors have repaired damaged hung ceilings under spray-on fireproofing or have done some corrective work on acoustic plaster.

4. Material - Next to each noted location, check-off type of asbestos material present.

5. Corrective Work - Next to each noted location check-off type of corrective method used for Custodian, Shops or Contractor.

6. Damage to hung ceiling - date reported. If custodian cannot repair damage to hung ceiling assembly under spray-on fireproofing, he is to indicate date damage was reported to Area Office for repairs.

7. Corrective Action On Hung Ceilings - Custodian is to report date hung ceiling repairs under spray-on fireproofing were made by Area Office or Contractor.

8. Water Damage - Date Reported - Indicate date water damage to spray-on fireproofing, soft acoustic/thermal material or acoustic plaster, was reported to Area Office for repairs.

9. Water Damage - Date Corrected - Indicate date corrective work by contractors (or shops) took place.

10. Custodian Log Book Stamped - Check-off whether Custodian sign-in book was stamped.

NOTE: Information on this form will be used to complete portions of the Asbestos Program Checklist.

BOARD OF EDUCATION OF THE CITY OF NEW YORK
DIVISION OF SCHOOL BUILDINGS
28-11 QUEENS PLAZA NORTH
LONG ISLAND CITY, N. Y. 11101
TELEPHONE: 361-7711

ANTHONY R. SMITH
EXECUTIVE DIRECTOR

TO: SCHOOL CUSTODIAN/SCHOOL CUSTODIAN ENGINEER

FROM: ROGER A. CHILJEAN RAC

SUBJECT: CUSTODIAL ASBESTOS PROGRAM REPORT
SPRAY-ON FIREPROOFING
SOFT THERMAL MATERIAL

Some of you have been participating in a monthly procedure to record damage on hung ceiling assemblies in buildings that contain spray-on fireproofing. We are expanding the reporting procedure to those schools that have soft thermal materials.

The attached form is to be used to report any damage. Framed data sheets, that should be posted in your office, identify the specific areas in which the materials were used.

Our purpose is to continue to monitor hung ceiling conditions since the assembly offers protection to (and from) the fireproofing material. We will be sending you these forms about three (3) times during the school year. Please respond as promptly as possible. In the event any damage occurs by water, maintenance or vandalism, don't wait until the next reporting period. Notify the Asbestos Task Force immediately.

Thank you for your continuing cooperation in this important matter.

ATTACHMENT
RAC:db

cc: Francescani
Forde

CUSTODIAL ~ ASBESTOS PROGRAM REPORT

SCHOOL BORO

DISTRICT

CUSTODIAN

DATE

LOCATION	WORK BY: CUSTODIAN	WORK BY: SHOPS	WORK BY: CONTRACTOR	MATERIAL: SPRAY-ON FIREPROOFING	MATERIAL: SOFT THERMAL	CORRECTIVE WORK: REPLACE ACOUSTIC TILES	CORRECTIVE WORK: STRUCTURALLY CONTAIN	DAMAGE TO CEILING DATE REPORTED	CORRECTIVE ACTION ON CEILING	WATER DAMAGE DATE REPORTED	WATER DAMAGE DATE CORRECTED	STOP SIGN STICKERS IN PLACE	ADDITIONAL NUMBER OF 'STOP SIGNS' REQUIRED		CUSTODIAN'S LOG Book Started
FOLLOW-UP															

BOARD OF EDUCATION OF THE CITY OF NEW YORK
DIVISION OF SCHOOL BUILDINGS
28-11 QUEENS PLAZA NORTH
LONG ISLAND CITY, N. Y. 11101
TELEPHONE: (212) 361-7711

ANTHONY R. SMITH
EXECUTIVE DIRECTOR

June 6, 1979
Dec 19, 1979
JAN. 29, 1980

TO: CUSTODIAN
CUSTODIAN ENGINEER

FROM: MR. HUGH FORDE

SUBJECT: APPLICATION OF STICKERS AND ARROWS TO IDENTIFY ASBESTOS MATERIALS

Transmitted herewith, are warning stickers and arrows. They are to be applied, as indicated below, to alert those who enter spaces that contain asbestos materials. Mechanics, specification writers, inspectors, designers and custodial personnel who report to these areas are instructed by the sticker to check with the Custodian for types of materials and their locations. Information sheets part of this package, contain that data. The sheets are to be framed and posted in your office.

These stickers are to be applied as follows:

A. ACOUSTIC PLASTER AND GENERAL APPLICATION INSTRUCTIONS

1. Stickers shall be applied at 20' intervals in corridors, (staggered on each side wall), Auditoriums, Cafeterias, Libraries and other areas larger than normal classroom sizes on the wall within 12 inches of the intersection of the finished ceiling (or hung ceiling) and the wall surface. In normal size Classrooms or smaller rooms a minimum of one sticker per short wall and two stickers for walls in excess of 20 feet long are to be applied. In closets, small toilets, Janitor's Sink Closets and other similarly sized areas, one sticker, applied on the wall facing the entrance door will be sufficient. In large areas, such as Auditoriums, Gymnasiums, Cafeterias, Libraries, etc., stickers are to be applied to the ceiling at 20' intervals in each direction.

(Continued)

2. Arrows are to be applied to point in the direction of the asbestos materials (see sample below).

B. SOFT THERMAL/ACOUSTIC MATERIAL

1. Stickers shall be applied at 20' intervals on the wall within 12 inches of the intersection of the finished ceiling and the wall surface.

2. If this material was used on a wall surface or portion of one, the Custodian should use his discretion in selecting an appropriate location. The sticker is to be applied as close as possible to the material, on a sound firm surface, not directly on the asbestos materials.

C. FIREPROOFING MATERIAL

1. If the structural members are visible, apply stickers to the wall surface 12" below each framing member containing asbestos fireproofing in every area of the building. If the fireproofing is concealed within a hung ceiling, follow instructions outlined in 1) and 2) above in Acoustic Plaster and General Application Instructions.

Retain the extra arrows and stickers as replacements. In the event they are removed or damaged, new stickers and arrows are to be replaced immediately.